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ABSTRACT

This 1975-76 final evaluation report of the Elementary Secondary Education Act Title I programs, in the Washington, D.C. public schools is divided in two parts. Part one focuses on the program's creation, purposes, goals, objectives, and administration. Part two describes the relationship between school achievement and student characteristics. Part one involves the following areas: a description of the target group, population figures, goals, purposes, objectives, and impact of the program on the exceptional student; a delineation of the recommendations based upon the characteristics of Title I students, types of programs offered, and educational outcomes; an outline of the legislative creation, program responsibilities, types of financial assistance offered, and the unique administrative structure of the D.C public school system. Also, target areas, eligibility requirements, student development and achievement goals, program design and implementation, evaluation, and dissemination of information are discussed as is an outline of the general design strategy. Part two of the evaluation accomplishes the following: summarizes selected characteristics of Title I students compared to their non-Title I peers; explores in detail the effects of the Title I program on achievement; elaborates upon some of the relationships between self concept, student achievement, and classroom behavior; examines the relationships between motor, psychomotor, perceptual motor domains and achievement of male and female, Title I and non-Title I students; contains a brief description of the cognitive theory proposed by Jean Piaget. Also, the relationship between Piagetian conservation ability and avhievement in both mathematics and reading is investigated; analyzes data regarding teachers, educational aids, inservice training,

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EVALUATION OF THE ESEA TITLE I PROGRAM OF THE PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

1975-76

FINAL EVALUATION REPORT

SUBMITTED TO:
DIVISION OF RESEARCH AND EVALUATION
THE PUBLIC SCHOOLS OF
THE DISTRICT OF COLUMBIA
WASHINGTON, D.C.
(UNDER CONTRACT NO. NS-0376-AA-NS-0-6-GA

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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KEY TERMS

AFDC	*Aid to Families with Dependent Children.*
CAP	*Conservation Assessment Package.* An individually administered instrument which assesses cognitive development among preschool and early school-age children. The *Conservation Assessment Package* is based on Jean Piaget's systematic developmental theory of cognitive growth, depicting a stage-by-stage process of a child's thinking. The subtests are: Numbers, Two-Dimensional Space, Continuous Quantity, and Weight.
	Consortium. Association between IBEX, Inc. and Roy Littlejohn Associates for the purpose of evaluating the D.C. Title I Program.
CTBS	*Comprehensive Test of Basic Skills.* A group-administered standardized test which assesses the student's level of reading and mathematics proficiency.
ESEA	*Elementary and Secondary Education Act of 1965.*
HEW	*Department of Health, Education, and Welfare.*
IBE	*Information Based Evaluation.* A model developed by IBEX, Inc., in conjunction with three state departments of education, which has been implemented in over 60 federal, state, and local evaluations in the last four years (cf. Chapter 4).
	Instructional Process Battery. Series of instruments assessing attitudes and activities of Title I staff and parents.
LEA	*Local Education Agency.*
NCE	*Normal Curve Equivalent.* A scaled score with $\overline{X} = 50$, S.D. $= 21.06$ (cf. Chapter 8).
OCE	*Office of Compensatory Education.*
PAC	*Parent Advisory Councils.*
	Process Evaluation. This type of evaluation monitors the strategies and procedures designed to change student or teacher behavior.
	Product Evaluation. This type of evaluation monitors the outcomes or effects of the program.
PFS	*Physical Fitness Survey.*
PMT	*Prescriptive Mathematics Test.*
PPE	*Process/Product Evaluation.* This type of evaluation explores the relationships among products and processes.
PRT	*Prescriptive Reading Test.*
RMC	*Resource Management Corporation.* The research group which developed the achievement impact evaluation models referenced in this document.

SEA	*State Education Agency.*
SGE	*Standardized Growth Expectation.* The difference between the pretest and post-test percentiles for an individual, expressed in standard score form (see Chapter VI.).
SIF	*Student Information Form.* A machine readable form used in the 1975-76 Title I evaluation. The form collects information on students including basic demographic data, program data, mobility data, and behavioral characteristics.
SOS	*Self Observation Scales.* A nationally normed, direct, self-report, group-administered instrument which assesses the student's affective domain.
USOE	*United States Office of Education.*

PART I

CHAPTER I. EXECUTIVE SUMMARY

Title I of the Elementary and Secondary Education Act of 1965 (Title I ESEA) authorizes grants to public education agencies to meet the special educational needs of children living in low income areas or in institutions for the handicapped, neglected, or delinquent. Children of migrant workers and American Indian children attending federal schools may also be served by programs established through Title I funding. Programs must provide educational and support services which are supplemental to the regular program offered by the public education agency, and payments are made to state educational agencies for grants to local education agencies.

The 1975-76 school year marks the end of the first decade of the District of Columbia ESEA Title I program. Since its inception in September 1965, the program has undergone several transformations in response to the special educational needs of a constantly shifting population of children. The number of pupils, number of schools, and level of funding have fluctuated greatly. In the most recent school year (1975-76), the Title I program served 17,000 students with a budget approaching 10.7 million dollars. The number of identified Title I pupils has been varied, ranging from 70,000 during the 1967-68 school year to 14,300 during that of 1972-73. The program structure itself has matured, however, despite the fluctuation in the size of the program participant group.

The Title I Comprehensive Program of the Public Schools of the District of Columbia has operated under its present organizational structure since the 1972-73 school year. During this time, it has serviced from 17,000 to 20,000 students annually. These students have been in kindergarten through the third grade and in the seventh grade. The rationale for primary grade selection has been to give the needed assistance early in a child's scholastic career in order to accelerate achievement. Seventh grade students were selected to facilitate the transition between the elementary and secondary school levels.

The target population served by the FY 1976 program resides in the public school districts selected for Title I participation. It includes students who were identified as (1) achieving at or below the 50th percentile on large city norms for either reading or mathematics, (2) repeating the grade, or (3) being two years older than their normal age for a given grade. Kindergarten pupils were identified on the basis of a standard preschool inventory (CTBS, Form A). In the eligible private schools, approximately 800 students were identified in grades one through eight.

During the planning cycle for fiscal year 1976, the most acute program need identified by Title I staff was that of raising the achievement levels of identified Title I pupils in both reading and mathematics. Additional needs identified as basic but varying in intensity from school to school were:

- To help pupils develop a positive concept of themselves and their ability to achieve success.
- To provide supportive counseling and guidance to students in the areas of health, economic need, absenteeism, and domestic problems as they affect educational growth and development.

The major goal of the Title I Comprehensive Program is to improve reading and mathematics skills and to strengthen affective development of identified Title I students as measured by standardized achievement tests and tests of affective growth. Students participating in the program will achieve more in reading and mathematics than they would have had there been no program. The primary evaluation question is whether students achieve above the expected no-treatment level by an amount which is both statistically and educationally significant.

Although the level of student achievement in reading and mathematics is of central concern, several other questions were posed during the planning stage of this evaluation. Following is a list of these questions. An asterisk precedes the questions given extended treatment in this report. The

questions without asterisks required extensive data analysis and would have considerably delayed completion of the document. These unaddressed questions will be answered in the early months of 1977 in a series of special reports.

- ** How do Title I eligible students compare with non-Title I students in reading and mathematics?
- ** What are the strengths and weaknesses in the reading and mathematics achievement subtest profiles for Title I students in grades K, 1, 2, 3, and 7?
- What student characteristics are most predictive of reading and mathematics achievement (student characteristics: sex, age for grade, years in the Title I program, type of program, preschool experience, size of family, classroom behavior, physical health)?
- What teacher process dimensions discriminate between classrooms with the lowest adjusted standardized reading achievement test scores and classrooms with the highest adjusted scores?
- How is the learning environment difference across the primary grades serviced by the Title I program?
- ** What teacher strengths and weaknesses are indicated by the process evaluation, and what inservice activities are suggested?
- ** Is the standardized reading and mathematics test redundant with the criterion-referenced reading and mathematics test and, if so, can one of the instruments be eliminated?
- ** How do Title I students compare with non-Title I students in terms of self concept development?
- ** What is the relationship between psychomotor development (gross and fine motor) and both reading and mathematics achievement and self concept development?
- ** Is there a causal relationship between achievement and conservation skills acquisition; if so, what is the direction of that relationship?

Title I students are characterized by a cluster or constellation of problems which interact to place these students at a clear and present disadvantage. Several of the characteristics which differentiate Title I and non-Title I students, as identified by the *Student Information Form*, are as follows: Title I students are less likely to have had preschool experience than non-Title I students; withdrawn behavior is from three to five times more prevalent in the Title I population; aggressive behavior is twice as prevalent in the Title I population with 25 percent of the Title I males being identified as showing aggressive behavior severe enough to interfere with educational progress. By third grade, one of every four non-Title I males and one of every seven females have repeated at least one grade. Non-Title I students are much more likely to participate in classroom activities. Non-Title I students are rated by their teachers as having families that are more supportive of school efforts than are Title I students. One in ten non-Title I students evidences economic need severe enough to interfere with classroom performance; two out of ten Title I students share this background characteristic. Title I students are three to four times more likely to require referral to Pupil Personnel Services than non-Title I students. Title I students are from two to three times more likely to have physical or health problems and are absent more than non-Title I students. Teachers report that one third of primary grade students in Title I designated schools evidence some type of linguistic difference that interferes with classroom performance; of this group 80 percent are Title I students. Teachers report that among non-Title I students there is a greater prevalence of experientially rich activity.

Perhaps the most important finding obtained from teachers' responses to the *Student Information Form* was that a substantial number of eligible students are not being identified by the norm referenced achievement test. Conversely, a number of students not needing Title I services are, on the basis of faulty test scores, being placed in the Title I program. The exclusive use of norm referenced tests for determining Title I eligibility is generating considerable undue dollar and human costs. Although no selection process will be one hundred percent accurate, the present system, adopted under USOE recommendation, is inadequate and should be supplemented by teacher judgment. The use of the *Student Information Form* provides a wealth of teacher judgment on each student, and this information should be utilized in selecting those students most in need of Title I services.

The results from both the *Comprehensive Test of Basic Skills* and the *Prescriptive Reading Test* and *Prescriptive Mathematics Test*, which were analyzed using two different RMC models, confirm that the D. C. Title I program is making a substantial impact on student reading and mathematics achievement over and above what would be expected had there been no program. The largest gains are at the first and second grade levels. Just as significant is the finding that non Title I students in Title I designated schools are also benefiting a great deal from the program, although these students are not directly served by it. The results indicate that Title I students are achieving from 0.20 to 0.30 standard deviation units above the no treatment expectation in both reading and mathematics.

The results of this evaluation confirm that achievement and classroom behavior are very much related to student self concept. Evidence is firm that need for Title I services correlates strongly with a lowered self concept. Conversely, students with no need for Title I services evidence positive self concepts. These differences hold for all students in kindergarten through third grade, with the largest differences shown on the Self Acceptance and Self Security scales of the *Self Observation Scales* (SOS). Overall, the self concept findings depict the high emotional price paid by low achievers. Repeated retention in school taxes the emotional well-being of children completely out of proportion to the academic benefits which are gained. These findings paint a bleak picture of frustration, self doubt, and anxiety, the perpetual companions of academic failure.

A pilot study was initiated this year on the relationship between fine and gross motor development and academic achievement. Evidence suggests the fine and gross motor development in young children may be much more sensitive to ambient environmental effect than either cognitive or affective development. Therefore, psychomotor measures may have potential for diagnosing environmental effect before long-term structural or biochemical effects appear. Results of this small pilot study support the wisdom of continuing this line of investigation with a large sample.

A salient pattern in Title I students' achievement profiles is that with each successive grade in school the student loses ground relative to the norm. One explanation for this finding is that at each successive grade, more and more learning demands understanding of relationships (relation eduction), and less and less of the material can be learned by rote (associative memorization). Title I students develop a learning style that relies heavily on associative learning.

The ability to conserve (for instance, knowing that flattening a clay ball does not change the amount of clay) is demonstrated when the general relation perceiving ability reaches a specific level. Some students are able to conserve earlier (without intervention or inducement) than the norm of age seven. Evidence is accumulating which shows that deficits in Title I students' achievement may reflect their unsuccessful attempts to respond associatively to material that is beyond their relation eduction capability. The solution is straightforward: stop presenting material that forces the child to respond associatively and give additional emphasis to concept development activities designed to improve student relation eduction capabilities.

Students enrolled in the Special Education Learning Center program register an increase in their achievement scores from pre to post in the areas of reading and mathematics as measured by

standardized achievement tests. Results of surveys given to principals, classroom teachers, parents, and learning center staff showed that they felt the program had achieved the goal of meeting the needs of exceptional students. Based on enrollment figures provided by the Coordinator of Special Education to the evaluation team, the program appears to have a problem in identifying as many eligible Title I students for services as proposed by the program design. The design calls for serving three hundred students a month; however, only one hundred ten students (a month) were served in 1975-76, and only twenty-two of these were actually identified for service through the Division of Special Education, D.C. Public Schools. Based upon results from the *Student Information Form*, it seems likely that there are at least three hundred students in need of services from the Special Education Learning Center program. Apparently, the screening process is failing to identify these students. Considering that the program is staffed to handle the full complement of three hundred students a month, failure to identify the students results in a rather serious under utilization of available resources.

CHAPTER II. IMPLICATIONS AND RECOMMENDATIONS

The purpose of program evaluation is to provide information to individuals at various levels within and outside the management structure, including board members, administrators, and classroom teachers. An adequately conceived and implemented evaluation should yield constructive recommendations useful in program planning at all levels. Based upon the information on the characteristics of Title I students, the type of program being offered, and the outcomes of this year's evaluation, the following recommendations are presented:

- Abandon the use of standardized achievement tests and assign the resources to (1) revise the *Prescriptive Reading Test* (PRT) and *Prescriptive Mathematics Test* (PMT), (2) develop alternate forms for the PRT and PMT, and (3) create prediction models to generate norm-referenced scores from the PRT and PMT objective mastery scores.

- Recognizing the human and dollar costs of retaining students, it is recommended that a commission or study team be assigned to oversee a controlled, longitudinal study of the effects of grade retention on student achievement, social development, and self concept.

- The current procedure for identifying students for Title I services is misidentifying a substantial number of students. The exclusive reliance on standardized test scores should be discontinued in favor of a "need index" computed from a weighted composite of teacher judgment, and criterion referenced test scores.

- The information currently being supplied by the PRT, PMT, and CTBS is less reliable than it could be if students were tested on their functioning level instead of their grade level. It makes very little educational sense to test a third grader with a third grade reading test when he/she is functioning on a first grade reading level. Based upon experience with out-of-level testing, however, teachers need guidance in properly identifying a child's functioning level in terms of PRT and PMT levels.

- Teachers report that over 33 percent of primary grade students demonstrate language differences sufficiently pronounced to interfere with educational progress. Neither the regular school program nor the Title I program presently includes either special language instruction or extensive teacher inservice in language instruction to counter the effects of these differences. It is recommended that consideration be given to expanding the role of language instruction in both the regular school curriculum and the Title I supplemental services.

- The Washington D.C. Title I program is a multimillion dollar enterprise with multiple objectives and components. What is very much needed is a systematic description of the program's structure, including the ways various components, dimensions, and aspects relate to one another. Availability of such a description is prerequisite to any attempts at identifying the relative contributions that various components make to overall program effectiveness.

- Discussions with Title I program staff, and Research and Evaluation Division staff highlight the need for a research specialist, assigned to Title I, responsible for translating selected evaluation findings into pilot programs. This individual would foster that important link between the evaluation team and program staff. The research specialist would work with the evaluation team in identifying the program implications of evaluation findings and then would work in concert with program staff to design a pilot project to test alternative strategies. Following the pilot study, program staff could decide whether a particular strategy (e.g., concentrating on relation eduction skills) should be infused

throughout the Title I program. It is recommended that funding alternatives for this position be given serious consideration.

- This year's findings appear to closely parallel those of last year in that Title I students evidence more behavioral problems requiring intervention than do non-Title I students. The number of students with behavior problems requiring special Pupil Personnel Services far exceeds the current capabilities of the Pupil Personnel Services Department. Some consideration needs to be given to either increasing the current funding levels or curtailing the scope of PPS services. This decision hits at the heart of the program's philosophy. Should the program focus exclusively on instructional activities and leave special services to the regular school program, or should special services be a major component of the Title I program? The current level of PPS funding represents an unsatisfactory compromise.

- Some attempt should be made to standardize the testing program in the private schools to be more harmonious with the public school Title I program.

- The excellent reception that inservice courses received from both teachers and aides, and the incidence of reported modifications of teacher classroom behavior indicate that this component of the Title I program is meeting with some success. Based on teacher and aide questionnaire results, a more efficient method of notification of availability of classes is in order. Sending in-house postal notices to eligible teachers and aides, and periodically advertising openings are methods to consider.

- A shift seems to have occurred in the utilization of educational aides from the 1974-75 to 1975-76 school year. The aides report that one of their main roles in assisting the Title I teachers is that of supervising pupils in activities outside of the classroom. The data of the previous year, obtained from Title I teachers, indicated that this was a job that the aides seldom had. This shift in the utilization of aides allows teachers to concentrate on activities which maximize student achievement in the classroom. The utilization of the educational aides in any mode which frees the teachers to concentrate their focus on their primary teaching activities is an appropriate use of the aides as a valuable classroom resource.

- Based on the results of the interviews with Title I school principals with health aides in their schools, several needs should be addressed in the upcoming year. Principals should be given a complete job description of their health aide's duties and responsibilities. A coincident effort should be made to delineate lines of management authority and responsibility to principals, aides, Title I staff, and public school nurses. The question of who should direct the duties of the health aides and what their responsibilities are should be addressed and resolved.

- The Title I health aides serve both Title I and non-Title I students. Present evidence does not indicate that the Title I students have unique health problems as a result of their Title I status, or that provision of health services to these students enhances their performance.

- The Title I Special Education Learning Center program is a well designed, comprehensive approach to educating students whose special needs cannot be addressed in a regular classroom setting. The criteria for selecting children for the program should be studied. The guidelines tend to exclude so many candidates, that the budgetary allocation for the program may not be fully utilized.

- The Learning Center population was determined by the Department of Special Education. It utilized established referral procedures. Based on the number of pupils who were enrolled in the Learning Centers, it cost Title I in excess of 3,500 dollars per student to provide services in FY 1976. A decision needs to be made as to whether the current

procedure for selecting students for the program should be restructured to admit more students or whether the program budget should be reduced in relation to the number of students being served.

- Private schools should undertake, using existing student achievement data, a longitudinal study to ascertain the viability of the present program structure. Student achievement gains are not uniform by grade level, and student achievement deficit seems to increase by grade level. A longitudinal study would suggest reallocation of resources to grade levels where these resources would be maximally effective.

CHAPTER III. PROGRAM DESCRIPTION

With the passage of the Elementary and Secondary Education Act of 1965, the United States government undertook a new role in education: large scale support of federally mandated programs aimed at specific goals. Just eighty-nine days after it was introduced into Congress, President Lyndon Johnson signed the act into law and said: "No law I have signed or ever will sign means more to the future of America."[3.1]

President Johnson's assessment was accurate. The Elementary and Secondary Education Act (ESEA) began a new era of massive federal aid to education. ESEA rightly has been called "the most significant commitment to education ever made by any national government."[3.2] In the first decade of its existence, ESEA's seventeen billion dollars provided new schooling opportunities for children of low income families; encouraged new ways of teaching and using instructional tools; expanded library facilities; promoted research and development activities; established testing, guidance, and counseling programs; and strengthened state departments of education.

ESEA has been amended and expanded since its original passage. In its most recent form, the act contains eight separate titles. Title I of the ESEA is the largest federal aid to education program. It was also the first federal law with built-in evaluation. It prescribes that effective procedures for evaluation, including the use of appropriate objective measurements, be adopted and applied to all Title I programs and projects at local, state, and federal levels.

The specific goal of Title I is to expand and improve educational opportunities for educationally deprived children. Title I provides financial assistance to public education agencies in order to meet the special education needs of five groups of children:

- Disadvantaged children living in low income areas.
- Children institutionalized due to neglect or delinquency problems.
- Handicapped children.
- Children of migrant workers.
- American Indian children attending federal schools.

Substantively, Title I has always been a broad program in that it is quite flexible in the manner of its implementation. Projects, for example, may serve preschoolers, grades 1-12, dropouts, and the physically or mentally handicapped in public schools. Services may also be provided to private school students. Health problems may be attacked, remedial reading may be emphasized, and cultural or recreational activities may be stressed. Significantly, pilot projects for identifying needs are not only permissible, but encouraged.

During the decade following the enactment of this legislation, educators have recognized an important fact: the concept of equal opportunity requires that educational programs be tailored to provide each child with an equal chance to succeed, regardless of his/her economic, ethnic, social, and cultural background. ESEA Title I provides funds for a variety of programs designed to meet the individual needs of educationally deprived children. Currently, all states and more than three-fourths of the nation's local school districts receive funds under Title I. The public schools of the District of Columbia have received funds under Title I since 1965.

The administrative structure of the D.C. Public Schools is unique because of the combined city-state status of the nation's capital. The state and local functions of public education normally found in separate agencies in other states are integrated into *one* system in the District of Columbia.

with one superintendent and one board of education. The school system maintains the state function for Title I grants through the state education agency (SEA), under the Department of Federal Programs, and the local function through the local education agency (LEA), within the Division of Instructional Services.

The state education agency is responsible to the Superintendent of Schools, the Board of Education, and the Office of Education for meeting and monitoring all federal requirements, program design, fiscal control, management, and communication. The Title I State Office Coordinator is the responsible official. The local education agency, on the other hand, is responsible for the administration of the Title I Comprehensive Program. Explicit functions of the LEA include the assessment, development, operation, implementation, dissemination, and evaluation of the Title I program. The LEA is also responsible for conducting related programmatic research. In exercising these functions, the local administration assesses the specified educational needs of the eligible Title I population; formulates measureable program goals; systematically plans, develops, and implements a comprehensive program responsive to the instructional and supportive needs of students; devises a management system for optimum delivery of program services; disseminates program information to school departments, local school units, the parent community, and the general public; and conducts internal evaluation procedures.

This past year, the LEA has utilized the strengthened staffing and organizational design which was approved by the Board of Education for the 1972-73 program. The 1975-76 Title I program staffing pattern is shown in Appendix II, which also contains the organizational design for the D.C. Title I Comprehensive Program. This staffing structure was designed to ensure effective implementation of the State Plan of Operation of the D.C. Public Schools through the employment of an efficient management system, the expeditious delivery of program services to local school units and to program sites, and the concentrated effort and commitment of all staff components to achieve the goals of the program.

The 1975-76 school year marks the end of the first decade for the District of Columbia ESEA Title I program. Since its inception in September, 1965, the program has undergone several transformations in response to the special educational needs of a constantly shifting population of children.

The number of pupils, number of schools, and the level of funding have fluctuated since the program began. In the most recent school year (1975-76), the D.C. Title I program served 17,000 identified pupils with a budget approaching 10.7 million dollars; in 1965-66, the program served more than three times as many children with less than half the budget. The number of identified Title I pupils vacillated from a high of 70,000 during the 1967-68 school year to a low of 14,300 during the 1971-72 school year.

The number of participating schools has also varied, ranging from a low of thirty-four schools in total (twenty-nine public and five nonpublic) in 1970-71, to a high of ninety-five schools (eighty-four public and eleven nonpublic) in 1967-78. Funding for the Washington, D.C. Title I program was highest in 1972-73, over eleven million dollars, and lowest in 1968-69, less than five million dollars.

Although its target population and available resources have vacillated, the philosophy undergirding the program has remained constant since its inception. In the D.C. Title I program, children are viewed as the center of the educational process. They are seen as total entities with their own peculiar needs and interests. This view implies that students' actions are affected by their intellectual, physical, and emotional processes.

Since the program's first year, many innovations have been developed, implemented, and evaluated. The program focus has closely reflected the identified needs of the children served; it has also served as a continuing assessment of the best means for meeting these needs. At its root, the Washington, D.C. Title I program has been designed to foster equality of opportunity through

the potential effects which improved reading and mathematics achievement should exercise on a child's performance.

The Title I Comprehensive Program of the Public Schools of the District of Columbia has operated in its present organizational structure since the 1972-73 school year. During this time it has serviced from 17,000 to 20,000 students annually in kindergarten through third and seventh grades. The rationale for primary grade selection has been to give needed assistance early in order to prevent achievement lag, and for seventh grade selection, to help bridge the gap between the elementary and secondary levels. The major goal of the program has been to improve significantly the reading and mathematics achievement of its students. Both internal and external evaluations have concluded that this goal has been reached each year on the elementary level and that some progress has been made on the secondary level.

Each year since its inception, the D.C. Title I program has been assessed as *adequate* by the United States Office of Education, with some components receiving a *more than adequate* or *exemplary* rating. The Parental Involvement Component, for example, has been in the *exemplary* category for three consecutive school years. Other recent accomplishments of the D.C. Comprehensive Title I Program include:

- *Balanced Curriculum Handbook.* This handbook was developed as a resource for classroom teachers in administering supplementary instruction for identified Title I students in kindergarten through grade three. Compiled and edited by an ad hoc curriculum task force of teachers, parents, and program staff, the handbook offers a wealth of learning experiences focusing upon three curriculum strands: concept development, language facility, and self concept. It is balanced in cognitive, affective, and psychomotor domains. At the request of the Board of Education, which reviewed and approved the draft edition disseminated to teachers in March, 1976, the final edition of the handbook will be disseminated to teachers in February, 1977.

- *Instructional Personnel.* The 1975-76 program increased the number of instructional groups from five to six. The new personnel group, Parent Assistants, performs a variety of nonprofessional yet necessary tasks within the classroom reading and mathematics programs. The inservice program for all instructional personnel has evolved concomitantly with the addition of new groups.

Five major factors influenced the program's planning and development: the philosophy of education of the District of Columbia Public Schools; the goals and objectives of the school system; the Congressional mandate; the *120 Day Report* of the Superintendent to the Board of Education; and the concerns of parents and staff for the needs of identified Title I children.

The most recent example of commitment was the ESEA Title I Planning Institute conducted in Airlie, Virginia, in August, 1976. This institute marked a modification in the proposal planning process. Previously, a series of workshops and meetings with representatives of the various Title I affiliates and associates comprised the proposal planning activities. This year the task was undertaken in a different setting, for a designated period of time, and with an enlarged and more diversified participation, in order both to broaden horizons and to lay the groundwork for the 1978 fiscal year.

TARGET AREAS

The District of Columbia has the fourteenth largest public school system in the United States, ranking ninth among urban schools. In the 1975-76 school year, the Public Schools of the District of Columbia served approximately 130,685 elementary and secondary school pupils, 95.3 percent of whom were Black. In the 1975-76 school year, a total of eighty-five schools — sixty-three

elementary, sixteen junior high, and six private schools -- received Title I funds in the District of Columbia. In the public schools, funds were targeted at children in grades K-3 and 7; in the private schools, funds were dispersed to aid students in grades 1-8. The process for selecting eligible attendance areas and project areas is one of the most difficult tasks in Title I program development. An *attendance area* is the neighborhood from which a school gets its students; a *project area* is an attendance area in which the children will get Title I services.

The criteria used for the selection of eligible ESEA Title I attendance areas for the District of Columbia for the 1975-76 school year were an income factor based on the 1970 census and the number of children eligible for free lunch. These two factors were weighted 60 percent and 40 percent, respectively. Following the guidelines developed by the U.S. Office of Education, the Washington, D.C. Division of Research and Evaluation combined these criteria in mathematical formulae to produce a ranked listing of the eligible school attendance areas.

Once attendance areas were designated, the project areas were selected. Three basic rules governed the selection of project areas:

- An attendance area must have had a higher number or percentage of children from low income families than the district average.
- No more attendance areas than either method of selection (percentage or numbers ranking alone) would provide were selected as project areas.
- No eligible attendance areas were skipped in selecting project areas.

The selection of the number of D.C. Title I project areas, designated as Title I Schools, was determined by the program approved by the ESEA Title I Office for the school year. All eligible attendance areas in the District of Columbia were chosen as Title I schools. There are two criteria for determining an individual child's eligibility: the child must have both resided in an attendance area served by a Title I school and been educationally deprived as defined by LEA selection criteria. Thus, participation in the Title I program was *not* restricted to poor children. However, the selection of participating schools, being based on low income factors, insured that a large number of participants would be poor. In the eligible public school attendance areas, the students identified for the purposes of participating in the D.C. Title I program were those in the kindergarten, first, second, third, and seventh grades who met the norm criteria presented in Table 3.1.

Table 3.1

Individual Eligibility Criteria for the D.C. Title 1 Program

GRADE	NORM CRITERIA	INSTRUMENT
K	At or below 50th percentile, national norms	Comprehensive Tests of Basic Skills/S, Level A
1	At or below 50th percentile, national norms	Comprehensive Tests of Basic Skills/S, Level B
2	At or below 50th percentile, local norms	Comprehensive Tests of Basic Skills/S, Level C
3	At or below 50th percentile, local norms	Comprehensive Tests of Basic Skills/T, Level 1
7	At or below 50th percentile, local norms	Comprehensive Tests of Basic Skills/T, Level 3

In the six eligible private school attendance areas, identified students were selected from those students in grades one through eight who both lived within the attendance areas of public Title I schools and fell below the citywide median in reading and mathematics test scores. Provisions were

also made for including all students who were repeating a grade, regardless of their test scores, as well as those who were two years or more older than normal age for that grade (based upon entry in the first grade during the year in which their sixth birthday occurred). The numbers of students serviced by the Title I program by grade are: kindergarten, 3859; first grade, 3769; second grade, 4203; third grade, 3514; and seventh grade, 728.

NEEDS ASSESSMENT

Knowing which children were eligible to receive help with Title I funds was not sufficient for a successful program; determining what eligible children needed was also required. Answers to questions such as these were obtained:

- What kinds of problems do eligible children have?
- Which problems does each child have?
- What can help correct the problems?
- Which problems must be addressed first?

Answering questions such as these is called a *needs assessment*. The law implies that each school district must do a needs assessment to expand and improve educational programs by various means (including preschool programs). These should contribute particularly to meeting the special educational needs of educationally deprived children.

Five steps comprised the needs assessment process for the D.C. Schools:

- Identify the educationally deprived children in an eligible attendance area.
- Gather information to determine what types of educational help these children need.
- Diagnose what the children's educational problems are.
- Classify the needs of the children and determine if their needs are academic, motivational, or medical.
- Establish priorities for the order in which needs will be met.

The desire to improve the educational opportunities of disadvantaged children created the backdrop for the needs assessment. During the planning cycle for the 1975-76 school year, principals, teachers, central office personnel, members of the Citywide Advisory Council, and local Parent Advisory Councils identified the needs of pupils, staff, and parents. Those needs are presented in Table 3.2.

Table 3.2

NEEDS IDENTIFIED FOR PUPILS, STAFF, AND PARENTS

PUPIL NEEDS
Increased reading and mathematics achievement.
Increased conceptual development.
Increased language development.
Increased self concept development.
STAFF AND PARENT NEEDS
Improvement of their skills in using the diagnostic prescriptive approach to meet individual pupil needs in reading and mathematics.
Active involvement of parents and other interested citizens in the decisionmaking areas of the instructional program at the local school and central office levels.

OBJECTIVES DEVELOPMENT

The needs assessment survey conducted in the target grades of public Title I elementary schools and in the identified populations of private schools revealed a cluster of pupil learning needs in the broad areas of reading, language, and communication; mathematics; background information and experiences; and affective behaviors for identified Title I students. Based on the needs assessment survey, a major goal for the 1976 Title I Total Learning Program was established: improve the reading and mathematics cognitive skills and affective learnings of identified Title I students, as measured by standardized achievement tests and tests of affective growth. Two primary goals with related objectives were derived from this major goal. The goals and objectives, as stated in the FY 1976 proposal, were as follows:

Goal 1: Increase pupil achievement in the basic skills of reading and mathematics:

Objective A. Given the services of the Title I Total Learning Center, 75 percent of the students will increase their reading and mathematics achievement by at least 25 percent of their previous achievement.

Objective B. Given the services of the Title I Total Learning Center, the remaining 25 percent of the students will increase their reading and mathematics achievement on a scale of 5 to 24 percent of their previous achievement.

Goal 2: Increase pupil growth in affective learning and creativity through a curriculum which integrates the core curriculum of reading and mathematics with other school subjects and learning experiences. Positive changes in affective learning will be accomplished through:

- Field trips which are curriculum related.
- Exposure of pupils to meaningful musical, dramatic, literary, and dance experiences through in- and out-of-school performances.
- Pupil involvement in the arts by pupil participation in drama, music, fine arts, and other art media.
- A multi-ethnic program of carefully planned literary and cultural experiences which expose children to books of their own culture and other cultures. The multi-ethnic goal will be for children to realize:
  - That they do have roots in the past based on a cultural heritage of which they can be proud.
  - That their culture has made important contributions to the total culture of their country and the world.
  - That each cultural group possesses creativity, inspiring imagination, poetic quality, and a philosophical outlook.
  - That other cultures have ways of looking at life and expressing ideas which can expand the children's own understanding.

To ensure the achievement of student goals, staff goals were also established:

Goal 1: The provision of a variety of modalities for instruction in the communication skills which accommodate the different learning styles of children through verbal language arts (listening, speaking, reading, writing), literature, and drama; symbolic language (mathematics); and the arts (music, dance, fine arts).

Goal 2: The establishment of a comprehensive program of staff development experiences for all levels of staff which utilized the team approach. Staff development will be in the areas of human relations, values clarification, organizational skills, subject matter content and techniques for curriculum integration, and classroom management.

PROGRAM DESIGN

A multiplicity of student learning needs requires a multidimensional strategy if students are both to achieve learning success and to realize their individual potentials for self-direction and self-actualization. Recognition of this fact, combined with the underlying program philosophy and the results of the needs assessment and objectives development, culminated in the 1975-76 D.C. Title I program design.

The child is the center of the Title I program. To emphasize the importance of serving all of the child's educational needs, the 1975-76 program was designed around the Total Learning concept. In order to develop the child's cognitive, affective, and social skills, a saturated learning environment was designed. This learning climate balances the diagnostic teaching of needed skills in reading and mathematics with interest-centered instruction and free-choice activity. In order to provide more individualized instruction for the Title I child, special instructional personnel and supplementary curricula were utilized. The child's first "teachers," the parents, were directly involved in the program, in hopes of supporting the child's total growth and development. By the provision of pupil support services, noninstructional factors were prevented from interfering with the child's ability to benefit from additional instructional assistance.

The components comprising the 1975-76 program design are displayed in Table 3.3, categorized by the areas addressed in each component.

Table 3.3
COMPONENTS OF THE D.C. TITLE I PROGRAM

CHILD RELATED
- Balanced Curriculum
- Affective Education
- Enrichment Experiences
- Summer School Program
- Special Education
- Preschool Expansion
- Follow Through
- Career Development
- Community Schools
- Private School Program

INSTRUCTIONAL SUPPORT
- Instructional Personnel
- Supplementary Curriculum
- Parental Involvement
- Staff Development

NONINSTRUCTIONAL SUPPORT
- Administration
- Evaluation
- Dissemination
- Noninstructional Support Services and Personnel

The breakdown by components presented in this section underscores the multidimensional strategy for solutions utilized in the Title I program.

Balanced Curriculum. The Balanced Curriculum component was designed to facilitate both affective and cognitive growth in the reading and language arts, and in the mathematics programs. In reading and language arts, four subcomponents were identified:

- Supplementary classroom instruction in language arts and language experiences for identified students.
- A variety of classroom strategies, activities, and materials for differing needs and learning styles of these students.
- Laboratory experiences to reinforce and supplement classroom instruction of identified students most in need of individualized instruction.
- Diagnostic prescriptive techniques for improving basic reading skills in the laboratory.

An eclectic approach incorporating language experience, basal readers, and phonics was utilized in the classroom. A diagnostic prescriptive approach incorporating diagnosis and prescriptive teaching was used in the laboratory. Individualized Personalized Instruction (IPI) was the method employed in providing learning experiences designed to meet each student's needs and interests at an individual level and rate of learning. Integration of all the communication skills — listening, speaking, reading, and writing — was emphasized. A variety of learning materials was available, such as paints, paper, books, periodicals, libraries, filmstrips, tapes, television, games, puppets, curriculum handbooks, commercial, and teacher-made materials.

In mathematics, two subcomponents were identified:

- Supplementary, concentrated classroom instruction derived from text and manipulative materials based on an upward spiraling core of basic skills for identified students.
- Diagnostic prescriptive, action-oriented laboratory program designed to reinforce and extend skills developed in the classroom.

As with the reading program, IPI was utilized. Multimedia techniques compensated for the varied learning styles in conceptual, application, and computational mathematics activities. Some of the materials used to meet the various needs, interests, and learning styles of Title I students were flash cards, games, recordings, manipulatives, measurement materials, media materials, learning packages, and learning machines.

Affective Education. Children who *are* able both to read efficiently and to solve mathematical problems experience positive feelings about themselves. However, those children who *enjoy* reading for pleasure and applying their mathematical problem solving skills encounter an even more exciting sense of personal worth. The affective component of the D.C. Title I Comprehensive Program was designed to promote this latter type of experience. Stated simplistically, the goals for the reading and mathematics domains, respectively, were:

- Increase the number of children who *can* read, *do* read, and *want to* read.
- Increase the number of children who improve their mathematical problem solving skills.

Affective education balances instruction in cognitive skills and activities specifically designed to develop positive self concepts and healthy interpersonal relationships. Interaction experiences include storytelling, mathematical games, dramatic play, peer group work sessions, creative writing, sustained silent reading periods for the whole classroom, and experiences outside the classroom.

Enrichment Experiences. Venturing into different places, examining and manipulating, and coping in strange environs were all deemed to be essential experiences in order for a child to become the active architect of his/her own life. Many disadvantaged students have meager experiences upon which to build sound academic foundations. The enrichment experience component was designed not only to bring experiences to the child; it also integrates these experiences with reading and mathmatics skills as well as with the development of basic self concepts. This component expanded the Title I pupils' educational opportunities by enriching their experiential background. Music, drama, the fine arts, Black studies, and field trip experiences supplemented the basic school program. Enrichment activities were scheduled for Title I pupils at an average rate of one per week.

Summer School Program. The summer school program operated as a half-day, six week extension of the regular school year learning center. The concentration on the balanced curriculum, affective education, enrichment experiences, support services, and staff development activities were included in both programs. Approximately 5000 public elementary school children in twenty five centers and 2000 public secondary school students in four additional centers participated.

Some of the students were taught in experimental multilevel classroom situations by a team of four staff members which included parents. This pilot project, known as the 4M Center Program, is in its second year. The four "Ms" represent: multimodel, multigrade, multi age, and multimedia. In this pilot project, thirty students at each elementary school participated. Traditional grade level designators were deleted. The population was stratified with 10 percent kindergarten students, 20 percent first graders, 30 percent second graders, and 40 percent third graders. The 4M Center Program, being a mixture of older and younger children, provided a natural setting for improving affective behavior and encouraging peer teaching.

Special Education. The special education component was designed to provide alternative therapeutic programming for Title I students experiencing severe learning problems. A total learning environment was created in which each child's educational impediments were identified and treated by an interdisciplinary learning center team. This approach was used in five elementary centers, providing a variety of learning settings for children in special education. This component is thoroughly illuminated in Chapter 12.

Preschool Expansion. This component provided for an early childhood program based upon the interaction of teaching methods oriented variously toward materials, teachers, and children. Emphasis was placed upon conceptual and linguistic development at the preschool level.

Follow Through. Follow Through is a national program designed both to augment and to capitalize upon the gains made by low income children in a Head Start, Title I, or similar preschool program. It is designed to meet the instructional, physical, psychological, and social needs of children from low income families. In the District of Columbia, two Follow Through centers provided services during the 1975-76 school year for children in the primary grades: The Morgan Follow Through Center and the Nichols Avenue Follow Through Center. The Morgan Center serviced approximately 300 students; the Nichols Avenue Center helped approximately 350 students. The Education Development Center of Cambridge, Massachusetts was the institutional sponsor for Morgan Center; the University of Oregon, the sponsor for the Nichols Avenue Center.

These two centers were planned as comprehensive child development programs offering social services to families of participating students. Academic instruction, nutritional advice, and health care services were also offered. Social services worked with families regarding the psychological needs of their preschool children. The aim was to help families both buttress the program of the center and understand the interlocking relationship of its various components. Academic instruction was designed to complement the Head Start preschool curriculum and to merge with those materials and methodologies being used at the respective schools attended by the children.

The centers offered general dental and medical health care. Diagnostic services and treatment were also available. Nutritionists analyzed the children's dietary needs and assisted parents and

school personnel in guaranteeing that the requirements were met. In addition, physical exercise programs were also structured for the children. Parental participation was encouraged through the employment of parents as aides, usage of volunteer services, and participation by parents in educational and community activities. A Parent Advisory Committee, composed of parents and concerned community members, played a major role in the planning and management of the project; this committee helped to establish policy and also monitored the program. Both centers operated throughout the regular school year, as well as during the summer.

Career Development. The Title I Comprehensive Program operated two projects to orient selected students to careers in business and industry: the Career Development pilot program and the Widening Horizons career orientation program. This component is also treated more thoroughly in Chapter 11.

Community Schools. Two community schools — Garnet-Patterson, a junior high school, and Harrison, an elementary school — housed centers for homework, remedial assistance, and informal education. The two community schools were designed to bridge the gap between the school and the community. They supplied resources beyond those offered by the regular school to identified Title I students with the greatest needs; they also extended the formal academic program through informal education projects. Both of these schools are discussed in greater detail in Chapter 11.

Private School Program. While private schools are ineligible for Title I services, children attending such schools may be serviced if they are identified as disadvantaged educationally and reside in the public school attendance areas which are under the auspices of the Title I project. Six private schools with students who met the Title I criteria participated in the program. The approximately eight hundred students identified for this program received assistance from reading and mathematics resource teachers and educational aides from the public school system.

Instructional Personnel. The design for the 1975-76 Title I program included six groups of instructional personnel. One of these personnel groups, parent assistants, was a new addition in the 1975-76 school year. The following six groups comprised the instructional personnel for the 1975-76 Comprehensive Title I Program:

- **Elementary Resource Teachers**

  Title I elementary resource teachers served as reading, language arts, and mathematics Title I curriculum leaders at the building level. They provided services to all Title I children identified for reading and mathematics assistance, and to classroom teachers of Title I students. Schools with identified populations of 250 students or less had one combination reading-and-mathematics resource teacher; schools with 251-350 identified students had one reading and one mathematics resource teacher. Schools with more than 350 students used two reading and two mathematics resource teachers.

- **Junior High Reading and Mathematics Teachers**

  Title I junior high schools had one reading and one mathematics teacher per school. These teachers supplied instructional services to identified Title I students in a self-contained learning center for a designated number of periods per week.

- **Regional Resource Teachers**

  The regional resource teachers served as a resource to teachers of identified Title I students within a designated region. Regional resource teachers helped those instructors who were familiar with compartmentalizing subjects to integrate and fuse subject matter disciplines. This was done in order to focus attention upon a compartmentalized content

area without defining a topic area. The teacher worked to help students use all the appropriate skills he/she had mastered (writing, spelling, computation, comprehension), in an effort to explore, define, resolve, or expand the content area. Solutions to real-life problems require selecting appropriate skills and integrating facts, regardless of subject matter boundaries. Facilitating a student's ability to solve real problems was the major function of the regional resource teachers. As with other instructional personnel, regional resource teachers were assigned to areas on the basis of the number of Title I schools. A total of ten regional resource teachers were assigned to regions as follows:

REGION	NUMBER OF ELEMENTARY SCHOOLS	NUMBER OF REGIONAL RESOURCE TEACHERS
I	13	2
II & VI	6	1
III	11	2
IV	17	3
V	15	2

- **Educational Aides**

Educational aides performed a variety of functions, thereby relieving the teacher of many necessary but time consuming tasks. Daily activities included reading stories; preparing flash cards or word games; administering teacher-made tests; supervising small group activities; operating audiovisual equipment, maintaining files, and recording test scores; escorting children to the auditorium, lavatory, or playground; and accompanying the teacher when the teacher was supervising children on the playground or in the lunchroom. Schools with no more than 100 identified students had one aide; those with 101 to 250 students, two aides; those with 251 to 350 students, four aides; and those with more than 350 students, six aides. These paraprofessionals were supplemented by new instructional helpers, the parent assistants.

- **Parent Assistants**

Parent assistants formed a new personnel group during the 1975-76 school year. The parents worked on a part-time schedule of twenty hours a week from September through June. As auxiliary instructional personnel, they performed a variety of nonprofessional yet necessary tasks within the classroom instructional reading and mathematics program. They worked with Title I children either on an individual basis or in small groups. Having parents of identified Title I children fill these positions increased the benefits of this instructional personnel group. The staffing pattern was the same as that for educational aides, with the number being assigned to schools based on the size of the Title I population.

- **Program Assistants**

The Title I program assistants served each center in a general resource capacity, providing assistance to classroom teachers of identified Title I students. Program assistants performed various functions related to the organization and management of program services at the local school level. Tasks completed by the program assistants included making contacts or arrangements for field trips or enrichment activities; maintaining accurate records concerning materials, supplies, and equipment; and acting as liaison between the classroom teacher and resource or support personnel. They also assisted with organizational details for workshops and special projects for staff or students and assisted in obtaining substitutes for teachers attending inservice programs.

These six groups of instructional personnel, in concert, provided a wide range of services for Title I children. Their services enabled more individualized attention to be given to eligible students and spotlighted the child as the center of the educational process.

Supplementary Curriculum. The purpose of the entire Title I program is to supplement rather than supplant those services normally provided. It follows that supplementary curriculum materials may be necessary to implement effective extra services. In the D.C. Title I Comprehensive Program, several supplementary curricula have been developed. Two examples of these are given below:

- The *Balanced Curriculum Handbook* (see p. 3.3).

- *Many Things by Mini People*

  This anthology of eight booklets is composed of stories, poetry, music, and art work created by elementary Title I students during the 1974 summer school program. Illustrative of the beauty, clarity, and appeal of the creative work of urban students, the anthology will be used in several ways. It will serve as a vehicle for peer sharing, motivation for student expression through the written word and the visual arts, and as a means of building student self-concept. It will also be a tool for independent reading. Approved by the Board of Education, the anthology was disseminated in September, 1976.

These curricula are recent innovations in the full-scale, evolving program in the District of Columbia, and implementation began in the spring of 1976.

Parental Involvement. Parents are the child's first teachers. Therefore, any thrust to provide permanent educational benefits must accordingly focus on sustaining active and meaningful parental involvement. The parental and community involvement component provided a structured, organized means of involving parents and concerned citizens in all facets of the Title I program. The family unit was linked through this involvement to the school and the general community. The primary goal of the component was to develop strategies which result in a more relevant Title I program; greater community support for Title I schools; and a more productive relationship among parents, administrators, community persons, teachers, and students.

The strategies for broad parental involvement offered parents opportunities for advisory roles, for giving supportive service to the Total Learning Centers through the local Parent Advisory Councils, for diversified training and continuing education, for participation in music and cultural enrichment activities, for obtaining vocational and employment information, and for greater outreach to the home and community through the dissemination of program information. Several aspects of the 1975-76 parental component should be highlighted:

- **Parent Assistants**

  This new staff position added ninety paraprofessionals to individualize even further the classroom teaching and learning situation.

- **Staff Teachers**

  The staff teachers for parent training and parent councils strengthened the Title I program.

- **Parent Advisory Councils (PAC)**

  This organization of school councils was initiated in Title I schools. PAC functioned as a vehicle for the direct involvement of parents as advisors on program planning, implementation, and evaluation at the school, intermediate, and district levels.

- **Parent Training**

  The parental involvement component was structured to include training for parents. Activities ranged from local workshops to national conferences.

- **Parent Education**

  During the 1975-76 school year, a proposal was designed for a continuing education program at Trinity College. The program will give college credit for parent enrollees.

- **Parent Volunteer Corps**

  The Parent Volunteer Corps is a strategy for broadening the teaching base by drawing parents into the educational program of their children in positive and practical ways. Parents who are members of the Volunteer Corps will assist students and teachers in each Total Learning Center.

  The parent maintains a volunteer supportive role and will not be considered employed or an employee, although a small expense reimbursement will be made available to cover incidental expenses of the parent volunteers, i.e., babysitting expenses and transportation. Training for parents will be a long-term, on-going process. Training will include activities to help parents gain skills to use in the school and classroom, as well as with their own children at home. A program of continuing education will also cover personal interest and self-improvement areas. It is anticipated that approximately 400 parents will participate as parent volunteers.

  Additionally, seventeen parent volunteers received training and served as members of the instructional teams in the 4M Centers of the summer program conducted during the summer of 1976. The 4M Center program was a multifaceted approach to meeting the multiple instructional needs of 500 Title I students.

- **AT-HOME Project**

  A summer alternative program was conducted, using home-learning materials with 500 parents and children.

- **TOPPS Chorus (Title One Parent-Partners Chorus)**

  The TOPPS Chorus was a medium for personal enrichment, as well as a vehicle for community outreach. An example was the group's performance as guest musicians for the Maryland State Title I Conference at the University of Maryland.

- **Publications and Dissemination**

  A pamphlet and slide-tape, "The In Thing," and a brochure, *Involved: Directions and Decisions on Parental Involvement*, were produced and disseminated to schools and parents.

- **Community Outreach**

  Parents and staff explored the resources of community organizations, government agencies, and local colleges for possible benefits to the program.

- **Bicentennial Parent Awareness Conference**

  This two day conference consummated the parent program, with over 800 registrants participating in educational and cultural events planned and developed by parents. The design addressed the contributions of parents as participants in their child's learning experiences. It also stressed the importance of providing parents with services which raise the level of personal and family goals and of parental aspirations for change and upward mobility.

Staff Development. The goal of this component was to provide all levels of staff and parents with the knowledge, skills, and attitudes needed to plan, implement, and assess balanced curriculum offerings in order to achieve reading and mathematics improvement. The participants in staff development included:

- Central Office Title I Staff.
- Regional Administrative/Supervisory Title I Staff.
- Regional Resource Staff.
- School Administrative Staff.
- School Title I Resource Staff.
- Classroom Teachers of Identified Title I Students.
- Title I Educational Aides.
- Title I Parent Assistants.
- Title I Program Assistants.
- Title I Pupil-Personnel Workers, Aides, Clinical Psychologists, and Psychiatric Social Workers.
- Title I Community Aides and Other Parent Workers.
- Parents.

The activities employed throughout the year were varied, interesting, and functional. Examples of these are seminars, symposia, workshops, demonstrations, lectures, and research and study sessions.

The staff development curriculum was structured around six major areas of emphasis or topics: planning, background, and development of major theories and practices in education, educational philosophy, curriculum development, curriculum implementation, and assessment. The Title I program provided 700 teachers with eighteen days of release time. By increasing Title I staff competencies, this component was to improve the quality of services provided for Title I children.

Noninstructional Support Services and Personnel. Factors unrelated to the instructional program might have interfered with the ability of some pupils to benefit from additional instructional assistance. The Title I program provided a strong and varied component of noninstructional pupil support services to reduce potential hindrance factors. Included in this component were four subcomponents: pupil-personnel services, urban service corps, health aides, and media services. Together, these four subcomponents alleviated factors which interfered with the Title I child's ability to benefit from supplementary instructional services.

The components comprising the Title I program all focused on meeting the varied educational needs of the Title I child. The realization that the child's intellectual, physical, and emotional processes affect all that the child is and does created the thread which wove the components into a unified program. All efforts stressed the integration of the child's various learning experiences into a more coherent whole.

PROGRAM IMPLEMENTATION

The local education agency was responsible for implementation of the Title I Comprehensive Program. The staffing and organizational structure ensured effective implementation of the State Plan of the D.C. Public Schools for the Title I Comprehensive Program through the employment of the following:

- An efficient management system.
- Well delineated job descriptions.

- The expeditious delivery of program services to local school units and to program sites.
- The concentrated effort and commitment of all staff components to achieve the program's goals.

See Chapter 11 for a thorough treatment of the D.C. Title I program's administration.

OUTCOME EVALUATIONS

Whereas process evaluation is conducted for the entire length of the project, to determine the status of project implementation, outcome evaluation determines how successfully the project has met predetermined objectives. The original legislation for ESEA Title I required that "effective procedures, including provision for appropriate objective measurements of educational achievement, will be adopted for evaluating at least annually the effectiveness of the programs in meeting the special educational needs of educationally deprived children."[3.5] Unfortunately, Title I evaluation reports were often not specific enough to give any indication of whether academic progress occurred. Therefore, Congress passed an amendment to Title I in 1970 which required the inclusion of performance objectives in Title I applications.*

The SEA is required by law to make a report to the Commissioner of the United States Office of Education regarding research studies "evaluating the effectiveness of payment under this title and of particular programs assisted under it in improving the educational attainment of educationally deprived children. . . ."[3.6] To meet the legal mandates, the Washington, D.C. Title I Program has been evaluated yearly since its inception in 1965. Data on programs, students, and processes were secured by means of regular school records, test results, questionnaires, interviews, observations, and other appropriate instrumentation. Statistical treatment and analysis was performed as required; a continuous feedback procedure was in operation. All instrumentation was reviewed by the appropriate school system personnel and accordingly approved for use. Confidentiality of data was required. The final evaluation reports were disseminated by the State Office to other states and throughout the school system as required by law.

DISSEMINATION

Title I uses the phrase "dissemination of information" to describe the process of letting people know about Title I. Dissemination for Title I currently means communicating about education needs, problems, and solutions. This facilitates rational consideration and appropriate utilization of the resultant knowledge. Both definitions, the one-way and the two-way sharing processes, have been used in Title I legislative requirements. The law includes separate provisions for four groups: the local education agency, the state education agency, parents and the general public, and teachers and other educators. The dissemination officer develops information materials and maintains a channel for information flow among Title I schools, school departments, districts, federal agencies, and the community at large. Examples of vehicles presently used to inform these groups about Title I follow:

- Title I operations manual. (This manual has been utilized by all those directly involved in the administration and operation of the District of Columbia's Title I program.)

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* A performance objective is a statement of what a program is intended to accomplish in terms which cite who is responsible, what is to be done, when the objective is to be completed, and how completion is to be measured.

- *Title I News and Notes.* (This newsletter, the recipient of many commendations, has been used to report on the many student, staff, and parent activities conducted within the Title I program. Published periodically, it has a wide audience, including USOE, parents, and staff in LEAs and SEAs throughout the nation.)

- *Many Things by Mini People.* (described on page 3.12)

- *Balanced Curriculum Handbook.* (described on page 3.3)

- *Involved: Directions and Decisions in Parental Involvement.* (This brochure describing parental roles in the D.C. Title I Program was distributed to schools and parents.)

- Public media. (Newspaper articles, radio, and television have all been used to describe Title I events to the general public.)

- *Evaluation of the ESEA Title I Program of the Public Schools of the District of Columbia, 1974-75: Final Evaluation Report.*

- Title I proposal planning activities. (The 1974 fall planning sessions for the FY 1976 proposal officially initiated the developmental process for the 1975-76 Title I program and provided another effective means of Title I dissemination.)

These vehicles for dissemination have provided a viable mechanism for communicating educational needs, problems, and solutions.

FOOTNOTES

3.1 Ben Brodinsky, "12 Major Events That Shaped America's Schools," *Phi Delta Kappan*, LVIII (September, 1976), p.75.

3.2 Brodinsky, p. 75.

3.3 Elementary and Secondary Education Act §101, 79 Stat. 27 (1965), 20 U.S.C. §241 (I) (1975). Sec. 101.

3.4 *Title I ESEA How It Works, A Guide for Parents and Parent Advisory Councils*, p.59.

3.5 *History of Title I ESEA*. Washington, D.C. Department of Health, Education, and Welfare, February, 1972, pp.1-2.

CHAPTER IV. EVALUATION DESIGN SUMMARY

The 1975-76 Washington, D.C. Title I program evaluation represents the second year of a longitudinal analysis. The evaluation questions addressed in this report were formulated during a series of design conferences involving Title I staff and the Division of Research and Evaluation. Although the evaluation was performed under contract to an external agency, the design and implementation of this evaluation were, in every sense, a collaborative effort. The Title I program staff made frequent suggestions on the process evaluation aspects of the study and provided time and enthusiasm to the design of process instrumentation. The Division of Research and Evaluation provided expert guidance and assistance in virtually every aspect of the study, from initial design and conceptualization to critiquing drafts of this final report. This chapter outlines the general design strategy; reviews the major evaluation milestones; lists the evaluation questions, instrumentation and sampling considerations; and summarizes the substudies addressed in this evaluation.

DESIGN STRATEGY

The conceptual framework employed in this evaluation is the Information Based Evaluation Model (IBE)* which views the primary task of evaluation as supplying information to individuals in decisionmaking roles. The model focuses on evaluation questions and the ways in which these questions can be most usefully answered for different audiences.

The concept of information utility is the overriding characteristic which differentiates *good* evaluation from *poor* evaluation and undisciplined data collection from information gathering. Judged by even modest standards of utility, educational research and evaluation has a pitifully poor record, and the educational manager or policymaker unfortunate enough to operate within this void must sift through mountains of data for those nuggets of useful information.

Within the social sciences in general and education in particular, the mechanisms do not exist for supplying information to those who need it. The traditional evaluation mechanism has not added much to the meager research contribution. Theoretically, evaluation should be a suitable mechanism, but it has suffered from both growing pains and an obsession to separate itself clearly from the research model. The IBE model hopefully suffers from no such obsessions, except the possible one of adhering strictly to the concept of information utility.

Another factor contributing to the inadequacy of present day evaluations is the relationship between program evaluation and the performance objectives movement. The symbiotic growth which these two concepts have enjoyed has served to reduce the full potential of educational evaluation. The crucial role which performance objectives play in program management is obvious; however, the question arises as to the part which objectives should play in evaluation. The IBE approach views program objectives as *a* focus of evaluation activity, but by no means *the* focus. More traditional approaches to evaluation have used performance objectives as the foundation for the planning and execution of evaluation activities. This procedure is considered inadequate for several reasons:

- Basing evaluation on performance objectives restricts the focus of evaluation to intended outcomes, thereby overlooking unintended outcomes which are potentially just as important.

*A. Jackson Stenner, *An Overview of Information Based Evaluation: A Design Procedure*, Information Based Evaluation Series Book 1, (Arlington, Virginia: IBEX, Inc., 1972).

- Performance objectives provide an inflexible basis for evaluation in that they are seldom changed during the program year; thus, information needs (which are fluid) cannot be adequately addressed.

- Even if information on the attainment of all performance objectives is provided, important information is invariably ignored because objectives are not developed with information needs in mind, but rather are developed as guideposts for program management.

- Objectives based evaluation often views each objective as an isolated area of focus, and thus important relationships are often overlooked.

If program objectives are inadequate as a foundation for evaluation, what are the alternatives? How do we define the parameters of evaluation, i.e., what are the reference points? In objectives based evaluation, the reference points are the program objectives. In information based evaluation, the reference points become both the information users for the program and information domains (i.e., information needs). Capitalizing on these two reference points, a technique called domain analysis can be used to define and focus the direction of evaluation.

Information based evaluation should not be considered as *objective-free* evaluation. Information based evaluation recognizes the importance of program objectives but only to the extent to which feedback on the objectives is considered important to information users. The overriding consideration is the type of questions to which the individuals involved desire answers. Priorities are established in both the information domain category (e.g., reading achievement, career awareness) and the information user category (e.g., School Board, Project Director, USOE-OCE), and the evaluation resources are expended to meet these identified priorities. An additional check on the adequacy of evaluation information is the extent to which the information leads to action. If no relationship exists between information and action, then the adequacy and quality of the evaluation effort is in doubt.

In polling the various information users, the evaluation team can often develop evaluation questions which relate to unintended outcomes or *shadow benefits*. These questions occur because all information users are probably not supportive of the program procedures and objectives; thus, their information needs will highlight aspects of the program which would not receive attention in an objectives based evaluation effort. Program developers and program staff generally have a well developed commitment for the program and are myopic in viewing the outcomes of the program. The possibility that the program may cause some unintended side effects is very difficult for them to comprehend, let alone accept. However, individuals or factions which have been against the program from the start are generally more than willing and able to identify potential weaknesses and unintended outcomes. Therefore, in serving each information user, the evaluation team can gain a balanced view of the program.

Information based evaluation recognizes that an evaluation must be dynamic if it is to be responsive. Program objectives rarely change during the project year; thus, the objectives based evaluation is static and methodical in responding to the information requirements. Information based evaluation accepts the fact that information needs are fluid, and new questions are posed throughout the program cycle.

By definition, a compensatory education program will possess characteristics that differentiate it from other educational practices. These characteristics are the ingredients in the program's *recipe*. If the recipe can be explicitly formulated, then it is likely that it can be replicated. More often than not, however, a program is judged successful in terms of the student outcome data, while the staff does not have the faintest idea of which dimensions of the program were responsible for success. Identification of the components or ingredients of program success is the goal of process/product evaluation.

In contrasting educational programs and classrooms, evaluations often identify the most salient or distinguishing characteristics of the programs, and subsequent successes and failures are attributed to these salient program features. For example, two compensatory education programs may be distinguished as "phonic based" as opposed to "sight based." The designators *phonic* and *sight* are accepted as sufficient for program comparison, despite the fact that there are undoubtedly dozens of more subtle differences (dimensions, strategies) among the approaches which are potentially more descriptive. Furthermore, the ways in which the approaches are alike receive little if any attention. The failure to go beyond simplistic, nominal designators or program descriptors contributes substantially to our inability to maximize the benefits of evaluation.

The IBE model addresses three primary classes of information and evaluation activity:

- Product (summative) evaluation.
- Process (formative) evaluation.
- Process/product evaluation.

Product evaluation assesses program outcomes; process evaluation monitors strategies and procedures designed to change student or teacher behavior; process/product evaluation explores the relationships among products and processes. Process/product evaluation seeks to determine which strategies in a particular program lead to desired outcomes and how these strategies can be replicated. Although often ignored, process/product evaluation is programmatically more important than either product or process evaluation. In terms of questions to be answered, product evaluation asks: "How are the students or teachers different after exposure to the new program?" Process evaluation asks: "What strategies differentiate the Title I program from traditional approaches and were these strategies implemented?" Process/product evaluation asks: "What are the relationships among the strategies and the outcomes of the program?"

Process evaluation is important because managers need to know *why* a program worked just as much as they need to know how successful it was. The first and most difficult step in process evaluation is to decide what strategies are being implemented which discriminate a Title I activity from a comparison activity.

MAJOR MILESTONES

An intrinsic artifact of the Information Based Evaluation (IBE) method of design is the growth in evaluation sophistication of the client. This comes about as a result of the close client-evaluator interaction, which is an integral part of the method of IBE evaluation design. As a result of the 1974-75 evaluation and the intensive effort which went into its accomplishment, the evaluators felt that the first design conference to be held under the aegis of the new contract would be excellent. We were not disappointed.

The first design conference was held on January 21, 1976, at the Title I office. The conference consisted of two major segments. The morning session involved an executive session with Dr. Mildred Cooper, Ann Pitts, and selected members of their respective staffs. This segment allowed both a thorough review of the 1974-75 evaluation report and a goal-setting session for the 1975-76 evaluation. The scope, tone, and direction of the 1975-76 report were set at this meeting.

The afternoon session consisted of a general design conference. In attendance were members both of the Title I staff and of the District of Columbia's Division of Research and Evaluation, whose contribution was deemed essential to a successful evaluation. The afternoon session involved a presentation by the Consortium of evaluation results, as well as a sharing of the results from the executive session. The single most important factor to emerge from the afternoon session, which

would subsequently establish the tone of this year's evaluation, was the designation of responsible Title I staff to pursue further the structuring of various Title I component evaluations.

Both the identification of evaluation information domains and the designation of responsible Title I and Research and Evaluation staff who would ensure complete illumination of program components and effects were occurrences which we, the Consortium, viewed with satisfaction. Dates, places and agendas were established for further component design conferences at the close of this afternoon session.

The program component design conferences were held according to schedule during February and March. The results of these discussions (whether taken from instruments, procedures, or evaluation strategies) were forwarded to the Title I office and to the Division of Research and Evaluation for comment and modification. All programmatic evaluation strategies were cleared with the appropriate staff responsible for that Title I component.

The primary factors in increased returns from last year's (1974-75) evaluation strategy should be noted. These alterations and additions arose as a result of the design conferences in January, February, and March. The optimum allocation of resources, time, and other evaluation constraints are represented by the following modifications:

- The use of the *Self Observation Scales* (SOS) as a measure of student self concept.
- The discontinuation of the birth weight study as a result of data acquisition difficulties.
- The continuation of the Piagetian conservation assessment with the previous year's participants (this was done only after parental permission was granted for student participation).
- The use of a revised *Student Information Form* (SIF) to gather information previously not identified. (A section of this form will be used to assess language strengths of Title I students. The information gleaned will allow program revision for identified groups of students.)
- The structuring of a very detailed examination of the Title I program components, including special education, career education, community schools, and health aides.
- The identification of a sample of Title I students to participate, given parental permission, in a psychomotor assessment using an instrument developed by National Testing Service. (This is a new instrument, which hopefully will add a new dimension to student cognitive and physical growth and also allow for program strategies to address this important educational dimension.)
- The further use of an expanded battery of optical scan forms tailored to meet specific needs for data acquisition.

These enumerated changes, as well as others not already mentioned, result directly from an alteration in the level of expectations of staff, both Title I and the Division of Research and Evaluation. This difference in expectancy level stems partly from participation in the design of the 1974-75 evaluations; it also derives from the realization that individual information needs can be translated into methodologies which ensure the fulfillment of those needs.

The Instructional Process Battery used in the 1974-75 evaluation sustained major revisions attendant to a series of design conferences held in February and March. The Consortium and members of the Title I and Research and Evaluation staffs visited all the Title I schools during

March and April. They presented the results of the 1974-75 evaluation to Title I faculty and discussed the scope and content of the 1975-76 Instructional Process Battery. In 1974-75 the battery was group-administered by a member of the Consortium. In 1975-76 the instrument was delivered to each teacher to be filled out, at leisure, over an extended period of time. The results of this latter method of administration were increases in both return rates and accuracy.

The data acquisition phase of the evaluation was completed by the end of May. All instruments were reduced to computer compatible form by the end of June, 1976. The Consortium was very pleased with the return rates, accuracy, and completeness of the instrumentation procedure.

The summer school portion of the evaluation was completed on time in August. It consisted of classroom observations and interviews within the Title I classrooms of the summer school program. All the summer school data has now been reduced.

The Consortium was privileged to participate in a Title I planning session at Arlie House, Virginia during the last week in August. Jack Stenner of IBEX, Inc., made a presentation to the Title I staff, Research and Evaluation staff, and the Superintendent and his staff; his presentation addressed the preliminary findings of the present year's evaluation. He also made recommendations pertaining to the future direction of the program. The major milestone, however, of this year's evaluation is the increased sensitivity of the actors in the Title I program to the availability both of methodologies and of a technology which facilitates the translation of programmatic information requirements into reality.

EVALUATION QUESTIONS

The Evaluation Design Document (March, 1976) contains a complete enumeration of the evaluation questions organized by information domain. Subsequent to submission of the design document, several revisions were made of the list of evaluation questions. At present the evaluation questions are organized into the following domains:

- Characteristics of Title I Children.
- Reading and Mathematics Achievement.
- Piagetian Conservation Assessment.
- Self Concept Development.
- Psychomotor Development.
- Instructional Process.
- Components of Success.
- Special Education.
- Staff Development.
- Administration and Support Services.
- Private Schools.

Several of these domains contain enough evaluation questions to warrant an entire chapter, whereas other domains have been logically grouped to form a chapter.

The following is a list of some major questions given attention in this year's evaluation:

- How do Title I eligible students compare with non-Title I students in reading and mathematics?
- What are the strengths and weaknesses in the reading and mathematics achievement subtest profiles for Title I students in grades K, 1, 2, 3, and 7?
- What student characteristics are most predictive of reading and mathematics achievement (student characteristics: sex, age for grade, years in the Title I program, type of program, preschool experience, size of family, classroom behavior, physical health)?
- What teacher process dimensions discriminate between classrooms with the lowest adjusted standardized reading achievement test scores and classrooms with the highest adjusted scores?
- How is the learning environment difference across the primary grades serviced by the Title I program?
- What teacher strengths and weaknesses are indicated by the process evaluation, and what inservice activities are suggested?
- Is the standardized reading and mathematics test redundant with the criterion-referenced reading and mathematics test and, if so, can one of the instruments be eliminated?
- How do Title I students compare with non-Title I students in terms of self concept development?
- What is the relationship between psychomotor development (gross and fine motor) and both reading and mathematics achievement and self concept development?
- Is there a causal relationship between achievement and conservation skills acquisition; if so, what is the direction of that relationship?

At the policy level four questions serve to summarize the foci of this evaluation:

- Do students who have been exposed to the Title I program achieve more in reading and mathematics than would have been expected had they not participated in the program?
- In what ways are the educational experiences of Title I students different from the educational experiences of non-Title I students?
- If Title I students do, in fact, learn more than expected, and if the educational experiences of Title I students are different, then in what ways are these experiences related to improvement in reading and mathematics?
- Are there differential effects of the Title I program which interact with student characteristics?

INSTRUMENTATION

To a great extent, the outcome of a successful evaluation depends on the quality of the instruments which are used to collect the data in that evaluation. All Consortium instruments used in the evaluation of the Title I program (1975-76), excepting the *Comprehensive Test of Basic Skills* (CTBS) and the criterion-referenced tests, were developed or selected with the working involvement of both the Title I and Research and Evaluation staffs. Each instrument used in the 1975-76 Title I evaluation is identified and briefly described in the following text. The instruments have been grouped into three categories: student, educational aide, and administrator and parent participation instruments.

Student Instruments

There were six instruments utilized in collecting student data in the D.C. Title I evaluation. These were:

- *Student Information Form* (SIF).
- *Self Observation Scales* (SOS).
- *Physical Fitness Survey* (PFS).
- *Conservation Assessment Package* (CAP).
- *Comprehensive Test of Basic Skills* (CTBS).
- Criterion-Referenced Mathematics and Reading Tests—
  Prescriptive Mathematics Test (PMT),
  Prescriptive Reading Test (PRT).

These six instruments together measure four domains of interest (demographic, affective, psychomotor, and cognitive); each will be briefly discussed in this section.

The *Student Information Form* (SIF) is designed to collect information from teachers about individual students related to background, home environment, and other essentially nonacademic and demographic factors. Table 4.1 catalogues the specific data questions addressed by the SIF.

Table 4.1

STUDENT INFORMATION FORM (SIF) DATA QUESTIONS

SCHOOL RELATED
- Preschool Participation
- Grades Repeated
- Grade Level
- Sex
- Title I Eligibility
- Absences
- Health/Physical Problems
- Language/Communication Barrier(s)
- Voluntary Classroom Participation

PERSONALITY RELATED
- Withdrawn Behavior
- Agressive Behavior
- Serious Behavioral Problem(s)

FAMILY RELATED
- Family Support
- Economic Need
- Experience (with Success) Background

The *Self Observation Scales* (SOS) are used to measure self concept at each grade level. This is a nationally normed group administered instrument with four levels: Primary, Intermediate, Junior High, and Senior High. With one exception, each level incorporates the subscales of its predecessors and includes additional ones as well. The primary level of the SOS is appropriate for the K-3 students in this evaluation; it has four dimensions:

- Self Acceptance.
- Self Security.
- Social Maturity.
- School Affiliation.

The intermediate level of the SOS is appropriate for the grades 4-6 level. Three additional dimensions are measured on this level of the SOS, and one scale (Social Maturity) is replaced by another scale (Self Assertion). The junior-high level (grades 7-9) scales, Form C are listed here:

- Self Acceptance.
- Self Security.
- Social Confidence.
- Self Assertion.
- Peer Affiliation.
- Teacher Affiliation.
- School Affiliation.

All of these scales, both primary and junior high levels, are described in detail in Chapter 7, "Self Concept Development."

The *Physical Fitness Survey* (PFS) examines seven factors of gross motor performance and four factors of fine motor performance. The PFS is an individually administered instrument, involving a wide ranging series of physical activities. It is also factor analytically developed and has been statistically demonstrated to be both reliable and valid.

In the first series of tests, the student combines the power of more than one muscle group to execute a task, which is then evaluated in terms of time and distance. Included in this section are the factors called Speed, Explosive Power, and Cardiovascular Endurance. The second group of Gross Motor factors is more a reflection of the body's ability to coordinate the activity of its muscles and joints than one of the muscles' ability to exert force and power. Factors included in this group are Flexibility and Agility. The last two Gross Motor Domain factors test the amount of force which can be exerted for a short duration against a fixed object (Static Strength) and the amount of force which can be exerted by a set of muscle groups for a period of time when the limbs are in motion (Dynamic Strength).

A second set of items from the PFS was used to measure four aspects of Fine Motor performance. These measures completed the total evaluation of each student's physical development. In conjunction with the height and weight recordings, they indicate levels of both static and dynamic aspects of physical fitness.

The *Conservation Assessment Package* (CAP) is designed to assess relation perceiving ability among preschool and early school age students. The package is among the few theory-based measurement devices available for use with children. The instrument itself is founded upon Jean Piaget's systematic developmental theory of ability and structure, depicting the step-by-step thinking process of children. The package measures the concept of *conservation* as applied to two dimensional space, numbers, continuous quantity, substance, and weight. This construct represents a pivotal point in a student's cognitive transition from the preoperational phase to a concrete operations stage.

Each of the subscale objects is presented to the child who is then asked whether they are identical and why. For example, two rows of either paired or unpaired checkers are used to assess both conservation of number and the concept of one-to-one correspondence. Conservation of two-dimensional space is tested with several paired arrangements of wooden blocks, sometimes identical in number within each group and sometimes not. To test for conservation of continuous quantity, equal or unequal amounts of popcorn kernels are poured into plastic tumblers and compared; the contents of one of the tumblers is then poured into a plastic plate, and tumbler-plate comparisons are made. Conservation of mass is tested with two equal balls of clay, one of which is rolled into a cylinder. Clay balls are also employed in a similar fashion to test conservation of weight.

The *Comprehensive Test of Basic Skills* (CTBS) is a group administered series of achievement tests for kindergarten through twelfth grade students. In this evaluation Form S, Level A was administered to kindergarten; Level B, to first graders; Level C, to second graders; Form T, Level 1, to third graders; and Level 3, to seventh graders. The CTBS achievement battery is designed to measure systematically those skill areas which the publisher believes to be prerequisite to effective studying and learning in school on a national basis.

The CTBS/S series for K-2 pupils assesses three basic skill areas: reading, language arts, and mathematics. The reading subtests include Vocabulary, Comprehension, and Total Reading; the language arts subtests involve Language Expression, Spelling, and Language Mechanics. Mathematics subtests are Computation, Concepts and Applications, and Total Mathematics.

The CTBS/T series for third and seventh grade pupils is comprised of five basic skill areas, but for this evaluation only reading, language arts, and mathematics were administered. The reading subtests are Vocabulary, Comprehension, and Total Reading; language arts subtests are Spelling, Language Mechanics, Language Expression, and Total Language; mathematics subtests are Computation Concepts, Applications, and Total Mathematics.

A criterion-referenced test is designed to determine the status of an individual student with respect to the curriculum objectives for specific grades. All items in the tests directly correspond to definite curriculum objectives. The test results are reported in terms of mastery or nonmastery of each objective represented therein.

The Title I program used two forms of the criterion-referenced test: the *Prescriptive Reading Test* (PRT) and the *Prescriptive Mathematics Test* (PMT). Both instruments have seven levels. A different test form has been developed to correspond to skills for grades one through six. For reading ability, one test has been developed for grades seven to nine. Each teacher had the option to administer those levels of both the PRT and PMT which most nearly matched the individual student's anticipated instructional ability in both skills. For example, a teacher with a class designated as fourth grade might wish to test five children with Level C in Reading, eighteen with Level D, and two with Level E. In mathematics, on the other hand, the decision might be to test twelve children with Level C, twelve with Level D, and one pupil with Level E.

The results for each student are reported with respect to mastery status for all the skills occurring at a specific level of the test. Each individual student's report is divided into major

sections of broad cognitive areas under which are listed abbreviated descriptions of the objectives measured. For each objective there is either a *plus* (+), indicating that the pupil has mastered that skill, or a *minus* (—), indicating that the skill has not been mastered at the time of testing. If the student did not answer the items related to a skill, the report will show a blank for that student on that skill. Both the number of items correctly answered and the number of items by which the skill was measured are listed under each objective.

The intent of the student mastery report is to provide the teachers with significant diagnostic information which should be helpful in planning both large and small group instruction. The major instructional objective areas on both the PRT and the PMT are displayed in Table 4.2, categorized by test levels appropriate to each grade.

Table 4.2

CRITERION–REFERENCED TEST OBJECTIVES FOR READING AND MATHEMATICS

TEST	LEVEL A (GRADE 1)	LEVEL B (GRADE 2)	LEVEL C (GRADE 3)	LEVEL G (GRADE 7)
PRESCRIPTIVE READING TEST (PRT)	Auditory Perception Visual Perception Comprehension Development	Word Perception Comprehension and Interpretation Study Reading	Word Perception Comprehension and Interpretation Study Reading	Word Perception Comprehension and Interpretation Study Reading
PRESCRIPTIVE MATHEMATICS TEST (PMT)	Sets and Numbers Numeration Operations and their Properties Problem-Solving Measurement Geometric Concepts	Sets and Numbers Numeration Operations and Their Properties Problem-Solving Measurement Geometric Concepts	Sets and Numbers Numeration Operations and Their Properties Problem-Solving Measurement Geometric Concepts	The System of Whole Numbers The System of Non-Negative Rational Numbers Measurement Informal Geometry Systems of Numeration Percent Graphs and Statistics

Teacher and Educational Aide Instruments

The teacher questionnaire is an individually administered instrument designed by IBEX in concert with the Title I and Research and Evaluation staffs. This evaluation tool is designed to assess teacher attitudes concerning classroom strategies, professional values, classroom environment, staff development, and inservice courses. It also provides limited teacher demographic data. The total battery consists of the following subsections:

- *Inservice Course Survey* is designed to elicit a teacher's view concerning the many Title I inservice courses which have been offered so far during this academic year.
- *Staff Development Survey* purportedly elicits teachers' comments concerning the different inservice activities (workshops, professional meetings, staff development days, and consultant visitations) in which teachers participated during the academic year.
- *Educator's Professional Values Scale* is a survey used to assess the teachers' beliefs regarding the teaching/learning process. This instrument contains the following empirical-

ly defined factors: attitude toward student-centered education, subject matter emphasis, teacher-directed versus student-directed orientation, and subject matter integration.

- *Classroom Management Inventory* is a direct, self-report instrument designed to measure the way teachers will respond in a series of hypothetical classroom situations. The instrument presents situations, each with four alternate actions; the teacher then selects the alternative which is most characteristic of the way he or she would respond.

- *Classroom Environmental Survey* provides information concerning the environment within the individual Title I classrooms.

- *Background Questionnaire* provides basic demographic data concerning the Title I aide; in addition, it collects data concerning the duties and responsibilities of an aide within a classroom.

Administrator/Parent Participation Instruments

- *Administrator Questionnaire* is designed to collect basic background data concerning the number of years of experience and the educational background of school administrators. The administrators are also requested to comment on their feelings concerning the strong and weak points of the Title I program in their schools.

- The *Parent Questionnaire* gathers information concerning parents and their children who are involved in the program. The parents respond to a series of questions which solicit their attitudes concerning their own involvement in the Title I program.

It has often been noted that otherwise sound program evaluation findings lack "generalizability" because careful attention was not given to sampling considerations when the evaluation was initially planned. In the present evaluation, most instruments were administered on a total enumeration basis. Instruments were administered to *all* eligible students. This fact increases the confidence with which the results of this evaluation may be generalized. Table 4.3 summarizes the sample sizes and sampling approach for each instrument employed in the evaluation.

Table 4.3
SAMPLING PLAN
TITLE I AND NON-TITLE I STUDENTS BY GRADE, BY INSTRUMENT

INSTRUMENT	TITLE I					NON-TITLE I				
Student Related	K	1	2	3	7	K	1	2	3	7
SIF	817	2596	2317	2565	901	132	1389	1087	1110	0
SOS	772	1806	1684	1555	684	107	955	894	735	532
PFS	0	38	42	40	0	0	40	40	40	0
CAP	0	170	175	172	0	0	74	82	88	0
CTBS	1268	1041	966	1210	395	158	529	518	590	0
PRT	0	339	467	313	0	0	339	293	98	0
PMT	0	405	482	326	0	0	874	287	109	0
Parent Questionnaire	550	550	550	550	550	550	550	550	550	550
Staff Related	948	948	948	948	948	948	948	948	948	948

SUBSTUDY OVERVIEWS

Two substudies were planned and implemented this year. The first study involved estimating *no-treatment* effects using three models developed by Resource Management Corporation (RMC). The major purpose of an evaluation design is to structure the context within which observations are made in a manner which supports unambiguous inferences about program effects. In Title I evaluation, the difficulties in estimating what students participating in the program would have achieved had there been no program are well known. In an effort to correct this recognized inadequacy of Title I evaluations USOE, under contract to RMC, developed three models, one of which will be used on all local Title I evaluations after 1977. These models are:

- Norm-Referenced Model
- Control Groups Model.
- The Regression Models.

Theoretically, the three models should provide essentially equivalent estimates of the effects of no-treatment. The present study provides an empirical test of this assumption and details several implications which this wide-sweeping USOE innovation promises for the Washington, D.C. Title I program.

The second substudy examines the relationships among the criterion-referenced reading and mathematics tests (*Prescriptive Reading Test* and *Prescriptive Mathematics Test*) and the norm-referenced reading and mathematic tests (*Comprehensive Tests of Basic Skills*). The purpose of this analysis was to determine the extent to which the criterion-referenced and norm-referenced tests are redundant. If these two instruments are repetitious, then a large savings could be realized by eliminating one of the instruments.

PART II

CHAPTER V. A PROFILE OF THE TITLE I CHILD

In the 1974-75 Final Evaluation Report, it was noted that Title I students are usually characterized by a cluster or constellation of problems. Successful intervention is complicated by the fact that multiple interacting problems require multiple interacting interventions if any progress is to be made. The findings summarized in this chapter serve to replicate some of last year's findings and also address several items not considered in the evaluations of previous years.

In the spring of 1976, each kindergarten through third grade teacher in Title I schools completed a *Student Information Form* (SIF) for every student in his/her class (19,000+ usable SIFs were returned). Questions on the SIF were developed in conjunction with the Title I program staff and Division of Research and Evaluation staff. These queries were built upon the results of the 1974-75 evaluation. The following discussion summarizes the differences between Washington, D.C. Title I and non-Title I students at each of grades K-3. It also notes sex differences on selected variables.

This question was addressed in the 1974-75 report.

Has the student had any preschool experience?
☐ yes ☐ no ☐ don't know

The findings were summarized as follows:

> The odds that a Title I kindergarten or first grade child has had preschool experience are even (50-50), while the odds are 2 to 1 in favor of a non-Title I child having had preschool experience. Boys and girls are equally likely to have attended preschool.

The findings of this year indicate that Title I students are less likely to have had preschool experience than non-Title I students, although the differences are not as marked as those reported last year. Overall, less than half of all Title I students enjoyed the benefits of a preschool experience, whereas more than half of non-Title I students so benefited. Also somewhat contrary to the findings of last year is that girls, whether Title I or non-Title I, are more likely to have had preschool experience than boys, a fact which is particularly interesting in light of the lower achievement profile among primary grade males. In view of the expanding literature supporting preschool experiences for disadvantaged children and the results of the evaluation of the last two years, it is recommended that a systematic follow-up of developmental and achievement profiles of preschool graduates be conducted to assess the merit in expanding this component of the Title I program.

The student has been enrolled in this class since:

SEPT.	DEC.	MAR.
OCT.	JAN.	APR.
NOV.	FEB.	MAY

The mobility among Title I students is not high. For example, over 90 percent of K-3 Title I students, on whom teachers completed the SIF, were enrolled in their respective classrooms during September and October. Surprisingly, non-Title I students evidenced a mobility rate of 14-18 percent over the course of the school year. Why non-Title I students should be more mobile than Title I students is not clear, and a plausible answer, at the present time, escapes even creative speculation.

Is the student withdrawn to such an extent that it interferes with his educational progress?

☐ yes ☐ some ☐ no

The 1974-75 Final Evaluation Report stated:

> Withdrawn behavior is from three to five times more prevalent in the Title I population. Surprisingly, males and females are equally likely to be nominated for this category by their teachers. The number of children exhibiting at least some withdrawn behavior peaks at twenty-eight percent at the first grade, but levels off at about twenty-two percent during second and third grades.

This year's findings suggest that the incidence of withdrawn behavior is similar to last year with from seven to eight percent of all primary grade students evidencing withdrawn behavior severe enough to interfere with the child's educational progress.

Is the student aggressive to such an extent that it interferes with his educational progress?

☐ yes ☐ some ☐ no

This question was addressed in the 1974-75 report, and the findings were summarized as follows:

> Aggressive behavior is about twice as prevalent in the Title I population. Not surprisingly, males are nominated more frequently for this category than females. The number of nominated Title I males increases from eighteen percent in kindergarten to twenty-eight percent in third grade. Similarly, nine percent of the Title I female kindergarten students are nominated, while sixteen percent of Title I female third graders are nominated. These steady increases may represent one behavioral concomitant of successive years of academic failure.

The current annual results mirror very closely the findings of last year. Again the pattern of reported aggressive behavior increasing with age may be observed. The fact that teachers rate as many as 25 percent of the Title I identified males as showing aggressive behavior severe enough to interfere with educational progress suggests a problem of major proportions. Overly aggressive behavior in the classroom not only inhibits the aggressive child's performance but also acts as a disturbing influence on the entire classroom. A question that deserves immediate research attention is whether, as seems likely, repeated academic failure is the cause of increasingly aggressive classroom behavior.

Has the student repeated one or more grades?
Indicate the grade(s) repeated:

☐ None ☐ 1st ☐ 2nd ☐ 3rd ☐ 4th ☐ 5th ☐ 6th ☐ 7th ☐ 8th

The 1974-75 Final Evaluation Report stated:

> Title I first graders are three times as likely to have repeated either kindergarten or first grade than are similar non-Title I students (23% of males and 16% of females have repeated at least one grade by the end of first grade). Only 9% of non-Title I males and 3% of non-Title I females repeat either kindergarten or first grade. By third grade the number of repeaters among Title I students doubles with 42% and 31% of the Title I males and females, respectively, repeating at least one grade. By third grade one of every four non-Title I males and one of every seven females have repeated at least one grade.

The 1975-76 pattern of grade retentions deviates very little from that shown in the 1974-75 results. Given the prevalence of retaining Title I students, it must prove informative to study the implications inherent in deciding to retain a child. For example, the effects of retaining or not retaining a first grader can be investigated. The student's classroom behavior, basic skills achievement, and self concept may be affected. A controlled study can be conducted to answer this question, and, given the human and dollar costs of a poor decision, such a study seems warranted.

Does the student participate in classroom activities?

5 4 3 2 1

Highest Degree — Lowest Degree

Title I students are two to three times *more* likely to be represented in the lowest category and two times *less* likely to be represented in the highest category. Again we observe that older Title I students are less likely to participate than younger students, and males, whether Title I or non-Title I, are less likely to voluntarily participate in classroom activities.

To your knowledge, how supportive is his family of his school efforts?

5 4 3 2 1

Highest Degree — Lowest Degree

The 1974-75 Final Evaluation Report stated:

> Title I students are twice as likely as non-Title I students to be in the lowest category of this variable. Likewise, non-Title I students are twice as likely as Title I students to be in the highest category. Family support seems to be more prevalent at the kindergarten level and gradually diminishes through the primary grades. Sex differences are nonexistent.

Teacher ratings for 1975-76 are very similar to the ratings of last year with the exception that females are rated as having slightly more supportive families than males.

Is there evidence that economic need interferes with classroom performance?

☐ Yes ☐ No

Teachers rate 18 percent of K-3 students in Title I schools as evidencing economic need sufficient to interfere with classroom performance. Whereas one in ten non-Title I students evidences economic need severe enough to interfere with schooling, two out of ten Title I students share this background characteristic. At the second and third grade levels, males are judged, on the average, to have greater economic need than females.

Does the student have serious behavioral problems requiring referral to the Pupil Personnel Services Department?

☐ Yes ☐ No

The 1974-75 report summarizes the last annual response to the above question, as follows:

> Title I students are three to four times more likely to require referral to Pupil Personnel Services than non-Title I students. The number requiring referrals almost doubles from kindergarten to first grade and then holds steady at about 15% for males and 6% for females. At third grade, 17% of the Title I males, 6% of the Title I females, 9% of the non-Title I males, and 2% of non-Title I females require referral. Approximately 1400 K-3 students are viewed by their teachers as requiring referral to Pupil Personnel Services.

The current annual findings closely parallel those of last year in that Title I students, whether male or female, evidence more behavioral problems requiring intervention than do non-Title I students. The number of students with behavior problems requiring special Pupil Personnel Services far exceeds the delivery capabilities of the Pupil Personnel Services Department.

To your knowledge, has the student any physical or health problems that interfere with the student's educational progress?

☐ Yes ☐ No

Ten percent of the K-3 population in Title I eligible schools have a physical or health problem. This ailment has either been previously diagnosed and made a part of the child's record or is sufficiently obvious to be recognizable by the teacher. Furthermore, this problem is judged by the teacher to be severe enough to interfere with the student's educational progress. Title I students are twice as likely to have a physical or health problem than non-Title I students, and males are apparently more susceptible than are females. The incidence rate among non-Title I females is one in twenty, whereas among Title I males one of every seven has physical or health problems that interfere with his educational progress.

How many days was the student absent for any reason during the school year?

Title I students are absent more than non-Title I students. Males, whether Title I or non-Title I, are absent more than females. One in three Title I first grade students is absent more than twenty days a year, whereas only one in nine non-Title I students is absent as many as twenty days. Absences show a substantial decrease with each successive grade.

To your knowledge, which of the following communication patterns exist which affect classroom performance?

☐ Bilingual ☐ Nonstandard English

☐ Dialect ☐ Aural ☐ Nonverbal

Teachers report that one-third of primary grade students in Title I designated schools (6500 students) evidence some type of linguistic difference that interferes with successful classroom performance. Of the group of students with language differences, 80 percent are Title I students. Teachers report that nonstandard English is the most prevalent language difference accounting for 60 percent of reported differences among non-Title I students. The purpose of including this question on the Student Information Form was to determine the incidence of language differences which might interfere with classroom performance. The findings clearly document the fact that linguistic differences are prevalent and, in the opinion of teachers, act as an inhibitor of learning. What is now needed is both a closer examination of how language differences are related to achievement and a controlled intervention study designed to ultimately improve standard English performance.

To what degree does the student's experience background bring about successful classroom performance?

5	4	3	2	1
Highest Degree				Lowest Degree

Teachers indicate that, on the average, only one in fifteen Title I students enjoys a culturally rich experiential background, whereas one in four non-Title I students enjoys similar favorable conditions. Differences between males and females are minimal.

Considering the needs of the students in your school, what priority would you assign to this student for special services offered through the Title I programs?

Highest	Middle	Lowest	Doesn't need special help
☐	☐	☐	☐

The staffs of the Title I program and the Division of Research and Evaluation have repeatedly questioned the use of standardized achievement tests as the exclusive criterion for identifying Title I eligible students. The concern is that standardized norm-referenced tests may fail (due to measurement errors) to identify students who have a great need for special help and, conversely, may identify some students as needing Title I services who really do not require them. In an attempt to address this issue, the evaluation team compared teachers' perceptions of the student's need for services with the test score results. Figure 5.1 summarizes the evidence for abandoning the exclusive use of test scores to select students in need of Title I program services.

Figure 5.1 Percent of Students Identified as Needing Title I Services Using Two Different Methods

		Norm-referenced test identified the student as needing special services: Yes	Norm-referenced test identified the student as needing special services: No
Teacher rated the student as having the highest priority for services	Yes	44%	16%
	No	11%	37%

Approximately 1,963 students were wrongly classified in the 1975-76 school year.

Two types of error are possible when selecting students for Title I services: false positives and false negatives. A false positive occurs when a student is identified by the test as needing Title I services when, in fact, the teacher judges that the student does not need extra help. In the 1975-76 school year, fully 11 percent of K-3 students in Title I designated schools were inappropriately identified (by the test) as Title I eligible and actually received such services.* A false negative occurs when the test indicates a student does not need Title I services when he has a definite need for such services as rated by his teacher. Fully 16 percent of needy K-3 students were denied Title I services because the norm-referenced test failed to yield an accurate reflection of each student's achievement level.

*It should be mentioned that these figures conservatively estimate the magnitude of the misidentification problem. We considered a student as misidentified only if the two methods of teacher and test identification were at maximum disagreement. Thus, a student identified by the test as needing Title I services but rated by the teacher as having "lowest" need was not considered a mismatch in this analysis. Only if the teacher had rated the student "doesn't need special help" would the student have been considered misidentified.

Costs are tied to both types of errors described above. There are dollar costs and human costs. A dollar cost is associated with providing Title I services to students who do not really need them (the result of false positives). Given unlimited resources, a luxury not enjoyed by the Title I program, false positives would not be so troublesome. The fact is that more students need the services than can be accommodated within the current budget constraints; thus, each student who receives help which he/she does not need deprives a truly needy student of Title I services. On the other hand, there is a profound human cost associated with failing to identify students who really need the aid (a product of false negatives). This is true particularly in light of the fact that students who do not need services are currently receiving them. Given both the dollar and human costs that result from exclusive reliance on norm referenced tests, some alternatives for student selection must be considered.

One alternative to exclusive use of norm-referenced tests to determine Title I eligibility is the construction of a "need index" which combines norm-referenced test results with teacher judgments regarding the student's problems. A thorough analysis of the Student Information Form data suggested, that if judgment is combined with norm-referenced test scores, a more accurate estimation of student need is possible, and presumably, less misidentification would result than if only norm-referenced tests were used. Figure 5.2 illustrates how SIF data and norm-referenced test scores can be used to decide which students receive Title I services.

The decision process described in Figure 5.2 accomplishes several objectives. First, considerable weight in making a decision as to whether a student receives Title I services is placed upon teacher

Figure 5.2 A Decision Process for Selecting Students for Title I Services*

Do the student's test scores in reading or math fall below the criterion cutoff (e.g., 50th percentile)?
Yes
Does the teacher assign highest priority to the student's needs for special Title I services?
Yes
No
No
Does the teacher assign highest priority to the student's needs for special Title I services?
Yes
Does the teacher consider the student's reading and/or math achievement to be at least one year below grade level?
No
No
Yes
Are classroom participation, experiential background, and family support ratings low?
Student is eligible for Title I services
No
Yes
Student is not eligible for Title I services

* This model is for illustration purposes only, and is not being recommended for use. A more analytic solution employing principal component scores is being developed.

judgment supported by documented evidence. If norm-referenced test scores support a student's eligibility for Title I services, and the teacher's judgment is in clear opposition to the test results, then the teacher's judgment wins out. The student is considered ineligible for Title I services. Similarly, if the student scores above the cut-off score but teacher ratings suggest a positive need for special services, then the student is considered eligible for Title I help. The decision process requires that the test scores and teacher judgment, as to need, validate one another. If the two pieces of evidence do not agree, then the decision rests on teacher judgment supported by documented evidence on a global rating of (1) need for Title I services, (2) functioning level of student in reading and mathematics, and (3) experiential background, classroom participation, and family support.

The results of this evaluation support a very strong recommendation regarding the way students are selected in the future for Title I services. The exclusive use of norm-referenced tests for determining Title I eligibility is generating dollar and human costs considerably beyond acceptable limits. Although no selection process will be 100 percent accurate, the present system, adopted under USOE regulations, is inadequate and should be supplemented by teacher judgment. The use of the Student Information Form provides a wealth of teacher judgment on each student, and this information should be utilized in selecting those students most in need of Title I services.

This chapter has summarized selected characteristics of Title I students which serve to discriminate these students from their non-Title I peers. It is tempting to focus exclusively on the problems shared by Title I students and to ignore the strengths and assets which all these children bring to the classroom. As we shall see in later chapters, Title I students have positive Self Acceptance scores and perform well on selected psychomotor tasks. Other authors have noted independence, persistence, worldliness, and positive self concept as characteristics which describe many Title I children. The fact remains that Title I students share a constellation of characteristics which *do* impede performance in school. To document these characteristics is obviously not to blame the child, but rather, to call attention to the multiplicity of factors which must be considered in developing intervention programs for Title I students. The prevailing practice has been to focus on problems in reading and mathematics achievement. A moment's reflection will indicate that low achievement in these areas is but one obstacle to academic success encountered by Title I students.

CHAPTER VI. STUDENT ACHIEVEMENT IN READING AND MATHEMATICS

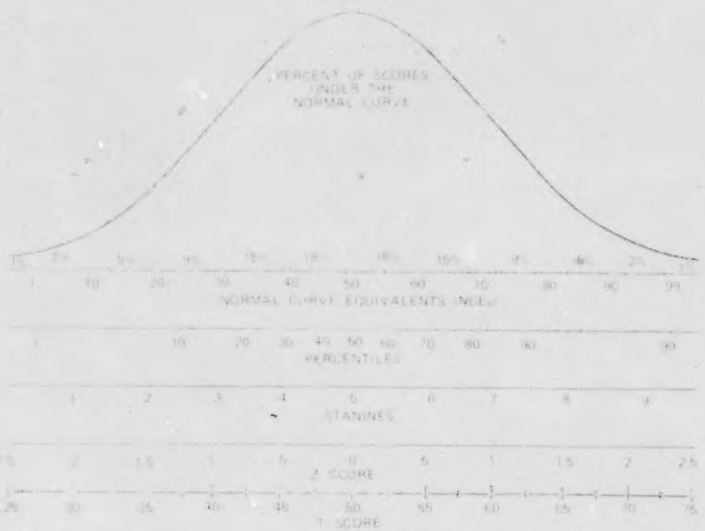
The primary objectives of the Washington, D.C. Title I program involve improving students' achievement in the areas of reading and mathematics. This chapter explores in detail the effects of the Title I program on achievement. The chapter is divided into six sections: (1) an introduction to the instruments and the metric or scale used throughout the chapter; (2) achievement in Total Reading, Total Language, and Total Mathematics by sex, grade, and Title I eligibility; (3) program impact in reading and mathematics; (4) causal dependencies among criterion-referenced subtests; (5) similarity of norm-referenced and criterion-referenced tests; and (6) a recapitulation of the major findings related to reading and mathematics achievement.

Introduction to the Achievement Tests and Metric

Two achievement tests were administered as part of this evaluation. The *Comprehensive Test of Basic Skills*, Form S (CTBS/S), a norm-referenced test, was administered in the fall of 1975 and spring of 1976 to all K-3 students in Title I designated schools. The Reading, Language, and Mathematics subtests of the CTBS/S were employed. In addition, the *Prescriptive Reading Test* (PRT) and *Prescriptive Mathematics Test* (PMT), both of which are criterion-referenced tests, were also administered in the fall of 1975 and spring of 1976. A more complete description of these instruments may be found in Chapter 4.

Throughout the remainder of this report, extensive use will be made of normal curve equivalents (NCEs). An NCE is a normalized standard score which has been linearly transformed to match the percentile rank scale at the 1st, 50th, and 99th percentile points. The NCE scale is simply a standard score scale which, for ease of interpretation, may be viewed as an equal interval percentile scale. NCEs have a range of 1-99, a mean of 50, and a standard deviation of 21.06. One advantage of NCEs is that, due to their equal interval characteristic, any mathematical operations may be performed. Another is that gain scores are easily computed, whereas grade equivalents and percentiles, which are not equal interval, do not lend themselves so easily to gain score analysis. A further inducement to use NCEs is that, in the near future, USOE will probably recommend that they become part of the evaluation system. Figure 6.1 illustrates the relationship between NCEs, percentiles, stanines, and Z-scores. A more complete discussion of these interrelationships is given in Appendix B.

Figure 6.1

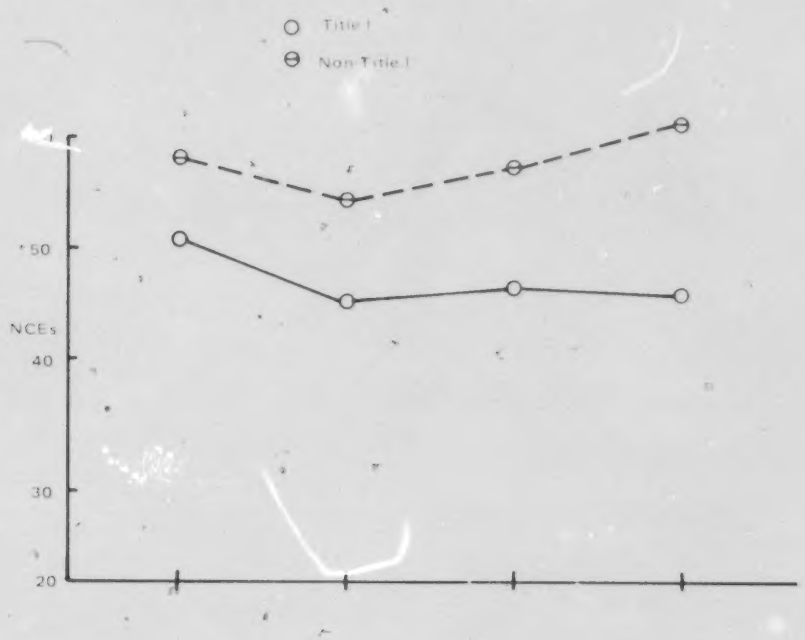


Achievement in Total Reading, Total Language, and Total Mathematics by Grade

The scale profiles derived from the analyses of the CTBS/S data for Title I and non-Title I students present interesting comparisons. Figures 6.2, 6.3, 6.4, and 6.5 display the CTBS/S scale profiles of group means in NCEs for Title I and non-Title I students by grade level. The profiles for the two groups in each grade level are well separated. Notice that for both groups in grades one through three, however, the actual profile or pattern of the scores is essentially the same. In the first grade, reading and mathematics achievement levels are approximately equal, while the language achievement level is somewhat lower. Then at grade two, mathematics performance begins to surpass both reading and language performance. At this grade level language achievement catches up to reading achievement. The same profile which is observed in the second grade is maintained at the third grade level.

Figure 6.2

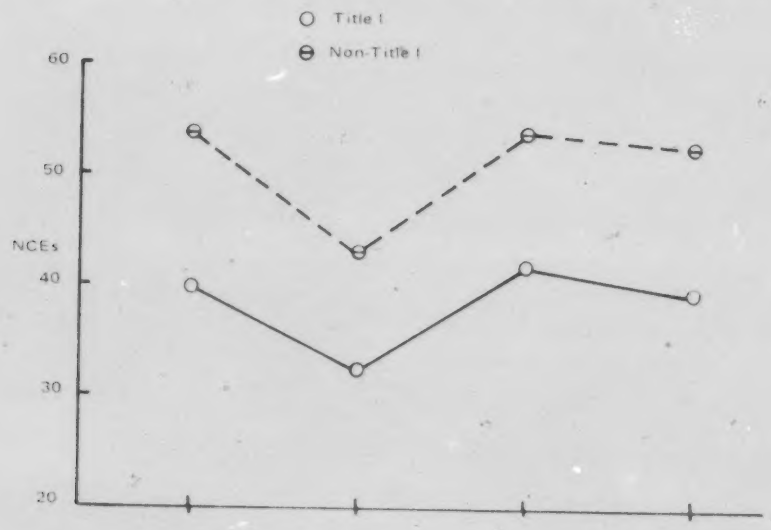
Mean Posttest Profiles of Title I and Non-Title I Students in Kindergarten on the CTBS/S Scale



	Alphabet Skills		Visual and Auditory Perception		Pre-Reading		Mathematics	
	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I
$\bar{X}$	50.8	58.1	45.2	54.4	46.5	57.4	45.9	61.2
S.D.	19.30	15.65	22.10	18.14	19.07	16.03	21.18	20.64
N	1268	158	1167	152	963	138	1235	147

Figure 6.3

Mean Posttest Profiles of Title I and Non-Title I Students in Grade One on the CTBS/S Scale



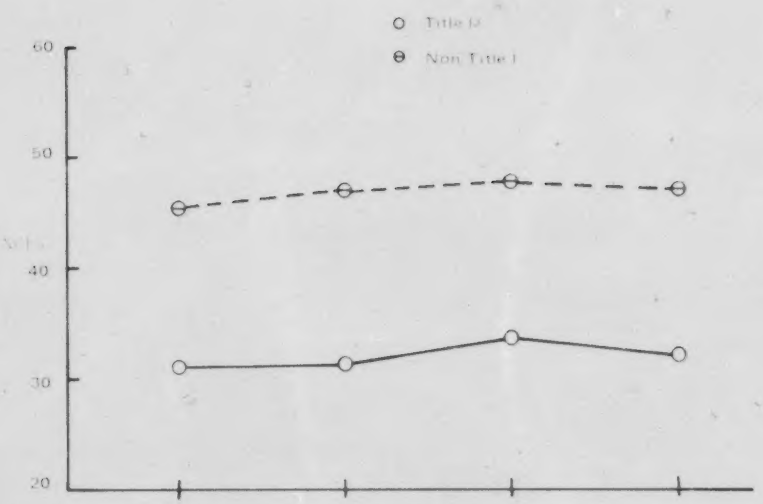
	Reading		Language		Mathematics		Battery Total	
	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I
X	39.9	53.7	32.2	43.0	41.8	53.8	38.5	52.6
S.D.	17.56	16.02	16.15	18.10	19.77	19.30	10.60	17.25
N	1041	529	1013	522	1013	514	829	451

Another aspect of these figures to be noted is the mean difference between Title I and non-Title I students on each scale for grades K-3. (The mean differences in kindergarten range from 7.3 to 10.0 on the specific achievement area scales, such as Alphabet Skills.) The variations increase in range from 10.8 to 13.8 at the first grade level and increase again, from 15.6 to 16.8, in the second grade. The mean differences at the third grade level range from 14.0 to 15.6, which were somewhat lower than those in the second grade. In general, however, for the upper grades the mean differences register approximately 14 or 15 NCEs for the specific achievement area scales. The battery total scales reflect mean differences which range from 14.1 to 17.2 across the four grade levels presented in these figures.

Recalling that the standard deviation of an NCE is 21.06, the dramatic implications of these results can be seen in Figures 6.2 through 6.5. On the battery total scale, Title I students are approximately two-thirds of a standard deviation below their non-Title I counterparts. On the specific achievement area scales, Title I students fall behind their non-Title I peers in kindergarten by one-third to one-half of a standard deviation; in first grade, by one-half to two-thirds of a standard deviation; in second grade, by two-thirds to four-fifths of a standard deviation; and in third grade, by approximately half of a standard deviation. These data illustrate that although Title I students clearly benefit from the program, the gap in achievement levels between Title I and non-Title I students increases from kindergarten to second and third grade. One possible explanation for these results is that non-Title I students in Title I schools are receiving "shadow benefits" from the program. This possibility is discussed further in the next section.

Figure 6.4

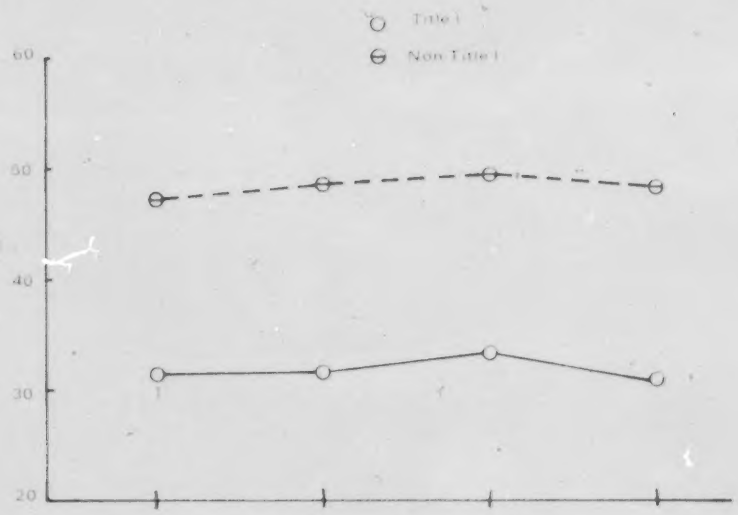
Mean Posttest Profiles of Title I and Non-Title I Students in Grade Two on the CTBS/S Scale



	Reading		Language		Mathematics		Battery Total	
	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I
X	31.5	47.1	31.7	48.5	33.2	49.3	31.0	48.2
S.D.	15.85	16.16	17.38	19.76	16.98	17.54	15.60	17.20
N	966	518	866	437	947	517	744	402

Figure 6.5

Mean Posttest Profiles of Title I and Non-Title I Students in Grade Three on the CTBS/S Scale



	Reading		Language		Mathematics		Battery Total	
	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I
X	31.1	45.5	31.4	47.0	33.9	47.9	32.1	47.1
S.D.	13.18	15.84	14.1	16.10	13.77	16.05	12.71	14.39
N	1210	590	940	533	1094	538	821	474

Program Impact in Reading and Mathematics*

Title I projects have as their primary objective improving the cognitive and affective performance of educationally disadvantaged students. In most Title I programs, improved performance is operationalized as improvement on norm-referenced or criterion-referenced reading and mathematics achievement tests and improvement on self concept or attitude scales. Title I project evaluations presume, among other things, to determine whether or not the Title I "treatment" results in improved student performance; however, methodological problems have conspired to render invalid most claims for Title I project effectiveness. This chapter presents several approaches to overcoming certain of these problems.

At least two types of information are needed to determine whether a Title I project has resulted in improved student performance. The first involves an assessment of how the project students performed on outcome measures such as reading comprehension and mathematical computation after participating in the Title I project. The second requires an estimate of expected student accomplishment, given the provision that the students have not participated in the program. If the observed accomplishment of project students exceeds their expected performance, and if the difference is both statistically significant (manifesting a greater difference than can be attributed to chance fluctuation in the scores) and practically significant (large enough to be educationally meaningful), then the Title I project is considered to have had an educationally significant impact.

It is a relatively straightforward procedure to calculate how well the project students performed on the outcome measures, but it is considerably more difficult to estimate how the project students would have performed with no treatment. Several approaches are available for assessing "no-treatment effect" or what students would have achieved had there been no special project. This next section of this chapter presents the results of two such approaches to estimating program impact.

Earlier it was stated that a primary objective of the Washington, D.C. Title I program is to improve reading and mathematics achievement among participating students to an extent that is statistically and educationally significant. Within this framework, treatment effect is the observed posttest performance minus the expected no-treatment posttest performance. Thus,

TREATMENT EFFECT	=	OBSERVED POST TREATMENT PERFORMANCE	−	EXPECTED POST NO-TREATMENT PERFORMANCE

The observed post treatment performance is simply the mean posttest score for Title I students on either the CTBS/S or the PRT and PMT. The no-treatment expectation is derived using two complementary models in an effort to converge on a valid estimate of impact (Bessey, Rosen, Chiang, and Tallmadge, 1976).

Norm-Referenced Model Results

With the norm-referenced model, the impact of the Title I program was computed as follows. The pretest percentiles of each student within the treatment group were converted to NCEs and averaged. A similar procedure was followed for posttest scores. Finally, the average pre and post NCE values were compared under the assumption that, without the Title I program, the treatment group would maintain its standing relative to the norm group. Stated another way, the pretest and posttest mean NCE scores should have been similar if the project had had no impact.

There are four assumptions which should be met if this model is to yield an unbiased estimate of program impact: (1) the pretest should not be used to select project participants; (2) the test must be

*G.K. Tallmadge and C.T. Wood, *Users Guide-ESEA Title I Evaluation and Reporting System*, Department of Health, Education, and Welfare, USOE, OPBE (1976).

given at the time(s) of the year when the test was normed; (3) comparable pretest and posttest forms must be used; and (4) only those students having *both* pretest *and* posttest scores should be used in the analyses. The present application of this model at the second, third, and seventh grade levels meets all but one of the assumptions. Both the kindergarten and first grade data, however, satisfy all of the requirements. The CTBS/S was normed only in the spring for the second, third, and seventh grade levels; subsequently, fall norms were linearly extrapolated from the spring data. To the extent that student learning throughout the year is nonlinear, the model may yield a biased estimate of program impact at the second, third, and seventh grade levels.

The pre- and posttest results expressed in NCEs for kindergarten, first, second, third, and seventh grade Title I students will be utilized in order to illustrate the gains in achievement which Title I students enjoy. Figures 6.6, 6.7, 6.8, 6.9, and 6.10 present the actual data for grades K-3 and 7, respectively, of the D.C. Title I program.* The mean pretest-posttest differences for all CTBS/S scales presented in these figures are statistically significant at a confidence level greater than 0.999 ($p < 0.001$) except for the Reading scale for seventh grade. This scale (see Figure 6.10) displays a statistically significant difference at a confidence level of 0.99 ($p < 0.01$). The mean differences range from 3.1 on Reading in grade three to 12.0 on the Total Battery for grade two. The median of these mean differences is approximately 7.34 across the five grade levels. The Mathematics mean differences tend to surpass those on the Reading scale for grades 1, 3, and 7 but not the second grade. Using a rule of thumb applied by Resource Management Corporation, exemplary gains are denoted by mean pre to post differences of 7.0 NCEs or more. Hence, using at least the Total Battery scales, exemplary gains have been shown in grades 1-3 and in the prereading component in kindergarten. In the mathematics component of seventh grade, the gain can also be called exemplary.

Relative to the scale standard deviations, the pre- and posttest differences depict even more sharply their significance. Thirteen of the eighteen scores for scales represented in Figures 6.6 through 6.10 have mean differences which are at least one-third as large as the corresponding standard deviations. The Visual and Auditory Discrimination scale in kindergarten, Reading and Language scales at first grade, and the Reading scales at the third and seventh grades *do not* have mean differences which are at least one-third as large as the scale standard deviations. On nine of the eighteen scales, the mean differences are at least half the size of the corresponding standard deviations. The Total Battery mean differences at the first and second grade levels particularly illustrate this point. All of these results for the five grade levels lend firm support to the contention that treatment effect is distinctly visible.

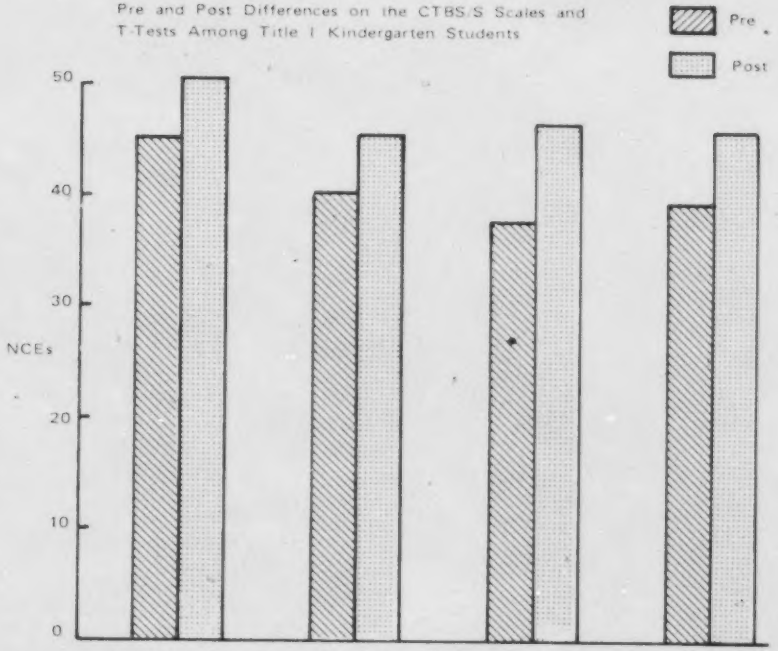
As noted earlier, the data for grades two and three violate one of the assumptions of the norm-referenced model. However, the kindergarten and first grade data, which do satisfy all of the requirements of this model, reflect statistically significant differences between pre- and posttest means for all of the CTBS/S scales. A similar result is documented by the second and third grade data, although the results at these levels are somewhat more substantial than those at the kindergarten and first grade. Thus, it is possible that the violation of the one assumption at the upper grade levels does not seriously and adversely affect the inferences which may be drawn from the second, third, and seventh grade data.

National norms were used as the criterion in this application of the norm-referenced model. In reference to the earlier discussion of treatment effect, it is necessary to consider the pretest means to be indicative of posttest results under the no-treatment condition. Then the posttest means in Figures 6.6 through 6.10 are actually the "observed" post treatment results; the pretest means, similarly, are the "expected" no-treatment results. Thus, the "treatment effect" is represented for each scale by the difference between the pretest and posttest means displayed in the figures. As stated previously, all of these values are statistically highly significant. Literally, they indicate that the D.C. Title I program militates against the effects of being educationally disadvantaged.

*Each scale on the CTBS/S, including total scales, are standardized and normed separately. Hence, the total battery score is normed by taking the score derived from all the items on the CTBS/S and not by forming a linear composite of the three skills areas total scale scores. Whenever this technique is used, the scaled total battery score may sometimes be lower than the other skills areas total scale scores. This effect is even more pronounced at the extremes of the distribution.

Figure 6.6

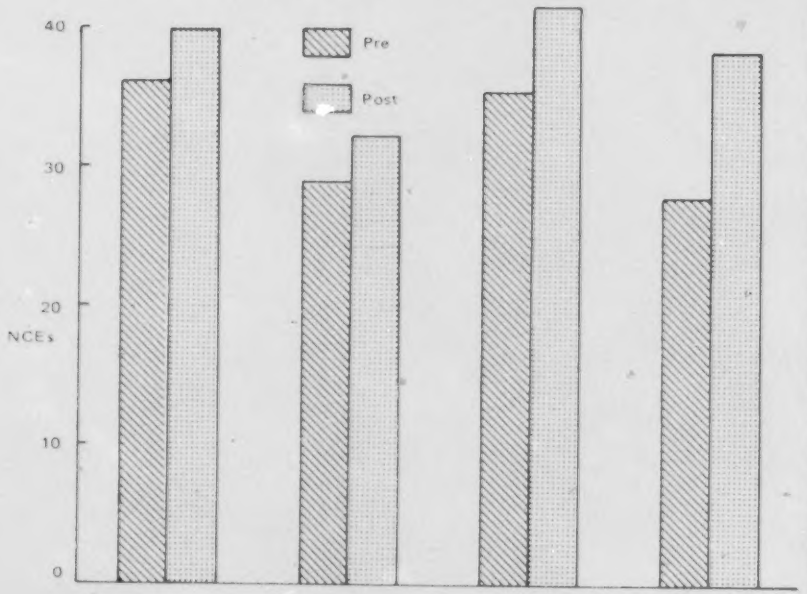
Pre and Post Differences on the CTBS/S Scales and T-Tests Among Title I Kindergarten Students



	Alphabet Skills		Visual & Auditory Discrimination		Pre-Reading		Mathematics	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
$\bar{X}$	45.1	50.8	40.2	45.2	37.7	46.5	39.1	45.9
S.D.	15.46	19.30	16.94	22.10	16.57	19.07	18.14	21.15
Difference	5.7		5.0		8.8		6.8	
N	1268		1167		963		1235	
T	11.30		8.12		16.54		10.42	
p	<0.001		<0.001		<0.001		<0.001	

Figure 6.7

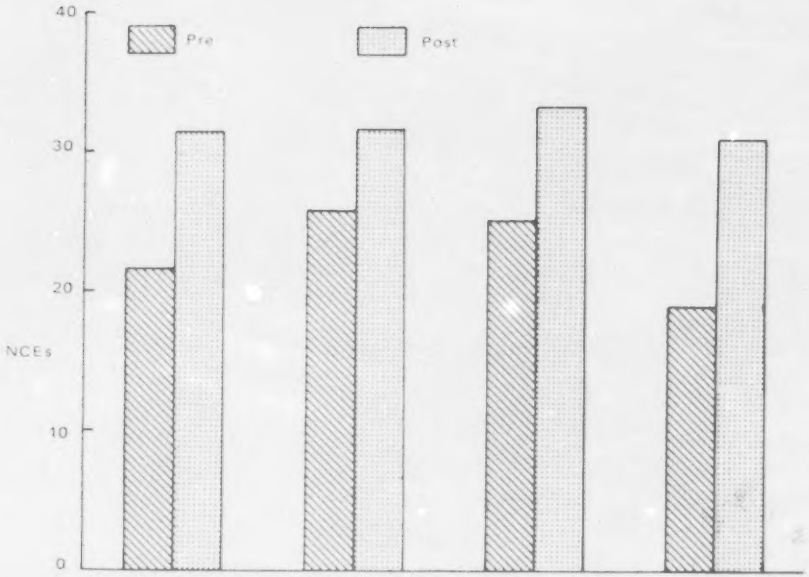
Pre and Post Differences on the CTBS/S Scales and T-Tests Among Title I First Graders



	Reading		Language		Mathematics		Total Battery	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
$\bar{X}$	36.1	39.9	28.9	32.2	35.6	41.8	27.9	38.5
S.D.	17.43	17.56	14.17	16.15	16.99	19.77	15.09	10.6
Difference	3.9		3.3		6.2		10.6	
N	1041		1013		1013		829	
T	6.31		6.13		9.14		17.29	
p	<0.001		<0.001		<0.001		<0.001	

Figure 6.8

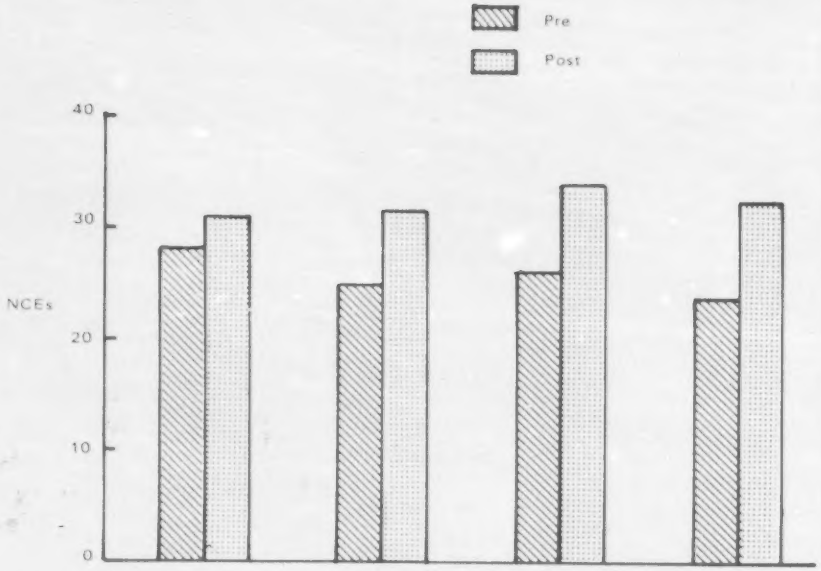
Pre and Post Differences on the CTBS/S Scales and T Tests Among Title I Second Graders



	Reading		Language		Mathematics		Total Battery	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
$\bar{x}$	21.6	31.5	25.9	31.7	25.1	33.2	19.0	31.0
S.D.	12.07	15.85	13.45	17.38	14.10	16.98	12.37	15.60
Difference	9.9		5.8		8.1		12.0	
N	966		866		947		774	
T	20.54		10.23		15.48		25.32	
p	<0.001		<0.001		<0.001		<0.001	

Figure 6.9

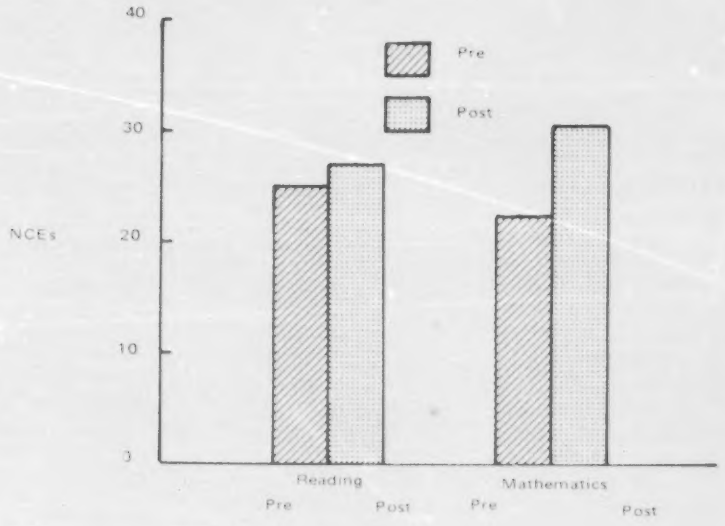
Pre and Post Differences on the CTBS/S Scales and T Tests Among Title I Third Graders



	Reading		Language		Mathematics		Total Battery	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
$\bar{x}$	28.0	31.1	24.9	31.4	26.0	33.9	23.5	32.1
S.D.	11.05	13.10	12.59	14.10	12.05	13.77	11.05	12.71
Difference	3.1		6.5		7.9		8.6	
N	1210		940		1094		821	
T	8.26		14.43		20.43		22.60	
p	<0.001		<0.001		<0.001		<0.001	

Figure 6.10

Pre and Post Differences on the CTBS/S Scales and T Tests Among Title I Seventh Graders



	Total Reading		Mathematics	
	Pre	Post	Pre	Post
X	25.2	26.8	22.5	30.6
S.D.	15.09	14.90	14.91	16.88
Difference	1.6		8.1	
N	395		305	
T	2.69		10.40	
p	<0.007		<0.001	

Control Group Model Results

In the present application of the control group model, raw scores on criterion-referenced reading and mathematics tests are compared (NCE gains can be derived, algebraically, by dividing the difference between the treatment group's posttest raw score mean and the no-treatment expectation by the standard deviation of the national sample and subsequently multiplying by 21.06). Through this procedure raw score gains can be converted to NCE gains. Unfortunately, there is no national sample standard deviation for the PRT and PMT, and it becomes necessary to make the following assumption: the ratio of the treatment group's standard deviation to the standard deviation of the national sample on the norm-referenced test is equal to the ratio of the treatment group's standard deviation to the national sample's standard deviation on the PMT and PRT. Since the two treatment group standard deviations can be calculated from the collected data and the standard deviation of the national sample on the normed test can be obtained from that test's technical manual, the estimated national sample's standard deviation on the PMT and PRT test can easily be derived (Tallmadge and Wood, 1976). Under the above assumption, the raw score gains have been converted to NCE gains to permit comparisons between treatment effect estimates yielded by the norm-referenced model and control group model, respectively.

Title I schools are selected according to a weighted index comprised of the total number and percentage of economically disadvantaged students as indicated by eligibility for free lunch and low family income. The control group model contrasts thirteen schools immediately below the cutoff with thirteen schools immediately above the cutoff. The rationale for the model is this: among the schools near the cutoff, it is largely chance which determines eligibility for Title I services. In other words, the schools immediately above and below the line do not substantially differ on educationally relevant variables. Thus, those schools not receiving Title I services can fairly act as a control group for those schools which operate Title I programs. This is because students within ineligible schools, even though their achievement levels might indicate a need for supplementary aid, do not receive any Title I services. Tables 6.1 through 6.6 give the pretest, posttest, no-treatment expectation, and treatment effect on the *Prescriptive Reading Test* and *Prescriptive Mathematics Test*, respectively, for non-Title I and Title I schools for first, second, and third grades.* The means for Title I and non-Title I third graders were not statistically, significantly different. Many of the students in non-Title I schools this year participated in the Title I program last year; they are enrolled in schools which are not eligible for Title I funds this year but were eligible last year. Hence, some of these students actually received supplementary services last year. If the Title I program was effective in the 1974-75 school year, then the current second and third grade students in non-Title I schools near the cutoff might be expected to display higher scores, as a group, than they would have had their schools not received Title I services in the previous school year. In other words, the treatment effects of the Title I program in the 1974-75 school year would continue to influence the achievement scores of those students who had been in the treatment group that year. This effect is sometimes called statistical contamination: the non-Title I second and third grade students in the current school year are not free from the influence of the previous year's Title I program.

Table 6.1
First Grade Pretest, Posttest, and "No Treatment" Posttest Expectation for Students in Title I Schools (N = 391) and Students in Non-Title I Schools (N = 339) On the Prescriptive Reading Test Subtests

Subtest	Pretest Raw Score: Title I	Pretest Raw Score: Non-Title I	Posttest Raw Score: Title I	Posttest Raw Score: Non-Title I	No-Treatment Posttest Expectation Raw Score	Treatment Effect in Normal Curve Equivalents
Auditory Perception						
$\bar{X}$	10.9	11.3	15.7	14.8	14.3	7.2
S.D.	3.2	3.0	3.4	3.7		
Visual Perception						
$\bar{X}$	10.5	10.6	13.0	12.7	12.6	3.1
S.D.	3.7	3.3	2.3	2.6		
Comprehension Development						
$\bar{X}$	17.7	18.3	21.8	21.2	20.6	4.6
S.D.	4.5	4.2	4.6	4.1		
Total Reading						
$\bar{X}$	39.0	40.0	50.5	48.7	47.3	5.4
S.D.	9.3	9.2	9.2	9.3		

In this Table "Non-Title I" refers to students in non-Title I schools, whereas elsewhere the term refers to ineligible students within eligible schools.

*Seventh grade students were not included in the control group model analyses because the appropriate control schools were not designated in time to be included in the comparisons.

Table 6.2

First Grade Pretest, Posttest, and "No Treatment" Posttest Expectation for Students in Title I Schools (N=405) And Students in Non-Title I Schools (N=874) On The Prescriptive Mathematics Test Subtests

Subtest	Prettest Raw Score		Posttest Raw Score		No Treatment Posttest Expectation Raw Score	Treatment Effect In Normal Curve Equivalents
	Title I	Non-Title I	Title I	Non-Title I		
Sets and Numbers						
$\bar{X}$	12.5	13.1	20.3	19.0	18.4	7.1
S.D.	5.0	5.5	5.3	5.4		
Numeration						
$\bar{X}$	5.4	5.8	9.1	8.8	8.4	5.5
S.D.	2.4	2.7	2.5	2.7		
Operations						
$\bar{X}$	8.7	9.4	16.9	15.8	14.8	7.8
S.D.	4.2	4.3	5.3	6.0		
Problem Solving						
$\bar{X}$	1.8	2.0	3.8	3.5	3.2	6.5
S.D.	1.3	1.3	1.7	1.7		
Measurement						
$\bar{X}$	7.2	7.3	9.5	9.4	9.3	1.7
S.D.	2.4	2.5	2.2	2.4		
Geometric Concepts						
$\bar{X}$	3.6	3.6	4.5	4.5	4.5	0.0
S.D.	1.3	1.4	1.3	1.4		
Total Mathematics						
$\bar{X}$	39.2	41.0	64.0	61.0	58.9	6.7
S.D.	12.7	14.3	15.1	16.2		

In this Table "Non-Title I" refers to students in non-Title I schools, whereas elsewhere the term refers to ineligible students within eligible schools.

The no-treatment expectation is an estimate of the posttest score that Title I students would have attained had they not participated in the program. The no-treatment expectation was determined by adjusting the observed posttest for differences in pretest scores between students in Title I and non-Title I schools. An examination of pretest differences between students in Title I and non-Title I schools revealed that this adjustment was important, because students in non-Title I schools consistently outperformed students in Title I schools on the pretest. A straight comparison of posttest scores for the two groups would be inappropriate, given that students in non-Title I schools had an initial advantage. Because it was expected that students in non-Title I schools would show an initial advantage, a principal axis adjustment rather than a covariance adjustment was employed (see Kenny, 1975).

On the average, first grade students in non-Title I schools have slightly higher pretests than first grade students in Title I schools. However, this pattern reverses on the posttest, with students in Title I schools showing higher Total Reading and Total Mathematics scores than students in non-Title I schools. This finding provides a strong argument for treatment effect at the first grade level. The results for the control group model do not indicate a Title I program impact at the second grade, although a moderate level of impact is found at the third grade. One plausible explanation for the absence of an effect at the upper grade levels is that some of these students benefited from the Title I program in previous grades. Given the strong effects at the second and third grade levels yielded by the norm-referenced model, it seems possible that the control group model is failing to identify an effect because the control group is contaminated with last year's treatment. However, the finding of a moderate effect at third grade raises doubts about the possibility of a contaminated control group. Another explanation is that certain assumptions underlying the present application of the control model are faulty; thus, the model yields an inaccurate estimate of program effect.

Table 6.3

Second Grade Pretest, Posttest, and "No Treatment" Posttest Expectation for Students in Title I Schools (N=467) and Students in Non-Title I Schools (N=293) on The Prescriptive Reading Test Subtests

Subtest	Pretest Raw Score		Posttest Raw Score		No Treatment Posttest Expectation Raw Score	Treatment Effect In Normal Curve Equivalents
	Title I	Non-Title I	Title I	Non-Title I		
Word Perception						
$\bar{X}$	28.1	27.7	34.1	33.7	34.0	0.3
S.D.	6.8	5.9	5.1	5.0		
Comprehension and Interpretation						
$\bar{X}$	30.4	27.9	42.4	41.4	43.8	2.2
S.D.	9.8	10.2	10.0	9.3		
Study Reading						
$\bar{X}$	14.7	13.5	18.6	18.5	19.6	3.5
S.D.	4.7	5.2	4.5	4.1		
Total Reading						
$\bar{X}$	73.2	69.0	95.1	93.5	97.3	2.0
S.D.	18.9	18.9	17.6	16.1		

In this Table "Non-Title I" refers to students in non-Title I schools, whereas elsewhere the term refers to ineligible students within eligible schools.

Table 6.4

Second Grade Pretest, Posttest, and "No-Treatment" Posttest Expectation for Students in Title I Schools (N=482) and Students in Non-Title I Schools (N=287) on The Prescriptive Mathematics Test Subtests

Subtest	Pretest Raw Score		Posttest Raw Score		No Treatment Posttest Expectation Raw Score	Treatment Effect In Normal Curve Equivalents
	Title I	Non-Title I	Title I	Non-Title I		
Sets and Numbers						
$\bar{X}$	18.1	17.3	23.5	22.3	23.1	1.4
S.D.	4.8	5.0	4.8	4.3		
Numeration						
$\bar{X}$	5.6	5.3	7.8	7.6	7.9	1.1
S.D.	2.0	1.8	2.3	2.2		
Operations						
$\bar{X}$	19.5	19.0	26.8	26.1	26.7	0.3
S.D.	5.9	6.0	6.7	7.4		
Problem Solving						
$\bar{X}$	3.2	3.1	4.6	4.6	4.7	1.2
S.D.	1.6	1.6	1.4	1.5		
Measurement						
$\bar{X}$	7.0	6.8	9.7	9.1	9.3	2.6
S.D.	2.7	2.4	2.6	2.6		
Geometric Concepts						
$\bar{X}$	5.2	5.0	6.5	6.1	6.3	2.1
S.D.	1.8	1.7	1.7	1.6		
Total Mathematics						
$\bar{X}$	58.5	56.4	78.9	75.8	78.1	0.9
S.D.	14.7	13.8	15.8	15.7		

In this Table "Non-Title I" refers to students in non-Title I schools, whereas elsewhere the term refers to ineligible students within eligible schools.

Table 6.5

Third Grade Pretest, Posttest, and "No Treatment" Posttest Expectation for Students in Title I Schools (N=313) and Students in Non-Title I Schools (N=98) on The Prescriptive Reading Test Subtests

Subtest	Pretest Raw Score		Posttest Raw Score		No Treatment Posttest Expectation Raw Score	Treatment Effect in Normal Curve Equivalents
	Title I	Non-Title I	Title I	Non-Title I		
Word Perception						
$\bar{X}$	31.04	31.14	34.38	34.40	34.3	0.2
S.D.	6.60	5.72	5.85	5.45		
Comprehension and Interpretation						
$\bar{X}$	28.87	29.76	33.19	33.18	32.4	1.5
S.D.	8.10	7.37	6.81	7.10		
Study Reading						
$\bar{X}$	24.33	25.40	29.17	29.65	28.6	1.2
S.D.	6.50	6.19	6.49	6.34		
Total Reading						
$\bar{X}$	84.24	86.30	96.74	97.23	94.4	2.3
S.D.	18.65	17.09	16.74	16.98		

In this table "Non-Title I" refers to students in non-Title I schools, whereas elsewhere the term refers to ineligible students within eligible schools.

Table 6.6

Third Grade Pretest, Posttest, and "No Treatment" Posttest Expectation for Students in Title I Schools (N=326) and Students in Non-Title I Schools (N=109) on The Prescriptive Mathematics Test Subtests.

Subtest	Pretest Raw Score		Posttest Raw Score		No Treatment Posttest Expectation Raw Score	Treatment Effect in Normal Curve Equivalents
	Title I	Non-Title I	Title I	Non-Title I		
Sets and Numbers						
$\bar{X}$	14.02	14.89	16.42	16.18	15.4	4.4
S.D.	3.58	3.23	3.21	3.03		
Numeration						
$\bar{X}$	7.27	8.09	9.47	10.02	9.2	1.2
S.D.	3.03	3.16	3.12	2.85		
Operations						
$\bar{X}$	22.04	24.27	31.73	32.78	20.7	1.9
S.D.	7.80	8.33	7.67	6.67		
Problem Solving						
$\bar{X}$	5.37	5.91	6.74	6.77	6.4	2.9
S.D.	2.41	2.38	1.82	1.80		
Measurement						
$\bar{X}$	13.86	14.69	16.44	16.76	16.0	1.6
S.D.	3.88	4.16	3.64	3.36		
Geometric Concepts						
$\bar{X}$	1.86	2.10	2.30	2.25	2.0	3.5
S.D.	1.12	1.13	1.20	1.15		
Total Mathematics						
$\bar{X}$	64.42	69.96	83.10	84.75	79.5	3.0
S.D.	16.58	17.92	16.55	14.44		

In this table "Non-Title I" refers to students in non-Title I schools, whereas elsewhere the term refers to ineligible students within eligible schools.

The first grade and third grade results from the control group model corroborate the findings of the norm-referenced model and confirm that the Title I program is having a statistically and educationally significant impact on student reading and mathematics achievement. The fact that two models using different achievement tests converged on a similar estimate of treatment effect strongly indicates that the estimate is valid. The fact that the two models do not converge on a similar estimate of treatment effect at the second grade, in light of the findings at the other two grades, is best considered a sampling anomaly. Replication of this analysis next year should afford additional insight into these second grade results.

In an effort to obtain a clearer understanding of the achievement differences between students in Title I and non-Title I designated schools, the individual PMT and PRT objectives were analyzed. As previously mentioned, the non-Title I designated schools may be contaminated in that some of these schools received Title I funds in 1974-75, and there may be some carry-over effect. Nonetheless, it is useful to examine the differences in objective attainment as an illustration of a powerful methodology and the insight it gives into the nature of observed program effects. Table 6.7 gives the objectives upon which students in Title I schools clearly outperformed students in schools not receiving Title I funding. The difference between the two groups surpassed 0.25 of a standard deviation. As expected,

Table 6.7

PMT PRT Objectives on Which Students in Title I Schools Clearly Outperform Students in Schools Not Receiving Title I Funds

	Grade 1	Grade 2	Grade 3
READING	Beginning Sounds Final Sounds Syllables/Numbers Complete Sentences Total Number of Objectives = 21	No Differences	No Differences
MATHEMATICS	Equivalent/Nonequivalent Sets Cardinality: Grouped Greater Than/Equal To/ Less Than Order of Numbers Equivalent Parts of a Set Halves/Fourths $\frac{1}{2}$ and $\frac{1}{4}$ of a Set Number Line Union Add Two 1-Digit Numbers Identify Open/Closed Sentences Total Number of Objectives = 45	Symbols for Greater Than/ Equal To/Less Than	No Differences

students in Title I schools show a clear advantage on several reading and mathematics objectives at grade one, but no such advantage is evident at grades two and three. Stated another way, there were no objectives on the PRT and only one on the PMT, which differentiated between the performances of Title I and non-Title I second grade students. Similarly, no large differences were found at the third grade level. These findings disagree with the results of the norm-referenced model, which showed a substantial program effect at first, second, and third grades. We propose to conduct a thorough analysis of the criterion-referenced test data in an effort to identify those objectives which the Title I program is most effective in attaining, as well as those for which additional instructional emphasis is indicated.

Causal Dependencies Among PRT Subtests

As pointed out elsewhere in this report, simply knowing that one variable is correlated with another is of little substantive value to program planners. For example, the knowledge that mathematics and reading achievement are correlated provides no direction to instructional reform. Similarly, a positive correlation between vocabulary and reading comprehension does not suggest any changes in the way students are taught to read. Simply stated, correlational data has little utility for educational planners, including board members and teachers. The major reason that correlational data affords limited support for policymaking is that it says nothing about causality.

Policy decisions, whether made at the district-wide level or at the classroom level, are intended to have an effect: to change the behavior of the teacher or student. Although it is known that vocabulary and reading comprehension are correlated, the benefits of apportioning more of the instructional resources to vocabulary building than to reading comprehension are not known. In the absence of knowing "what causes what," commercial reading systems are bought which make such instructional decisions for the purchaser. The hypothetical authors of the fictitious "Super-Duper Reading System" suggest emphasizing vocabulary building in the first grade, phonics in the second grade, and comprehension skills in the third grade. It is assumed that the publishers and authors have evidence to support such a differential allocation of teaching resources. The plain fact is, however, that no such evidence exists. One guess is as good as another regarding which skills should be taught first and which objectives should be emphasized at what grade levels. A tremendous amount of folk wisdom surrounds the teaching of reading, most of which has remained unchallenged for the past fifty years.

A recently developed research technique promises to give educational planners the types of causal information needed to make major advances in the quality of reading instruction. The technique is comprehensively described in Appendix C. Briefly, the method, cross-lagged panel analysis, permits causal inferences to be made from correlational data taken at two or more points in time. The PRT and PMT are given in the fall and again in the spring, thereby providing an excellent opportunity to apply the technique. The question to be answered with this procedure is this: are there causal relationships among the PRT subtests which suggest a redirection of instructional emphasis at the various grade levels?

Figures 6.11 through 6.16 summarize the necessary information. Of particular interest in each of the panels are the correlation coefficients on the diagonal. For example, Figure 6.11 shows $r=0.17$ between fall Auditory Perception and spring Visual Perception, and $r=0.32$ between fall Visual Perception and spring Auditory Perception. This suggests that most of the activity is in the direction of Visual Perception causing Auditory Perception.

Figure 6.11

First Grade Cross-Lagged Panel Correlations (N=1218)

Figure 6.14

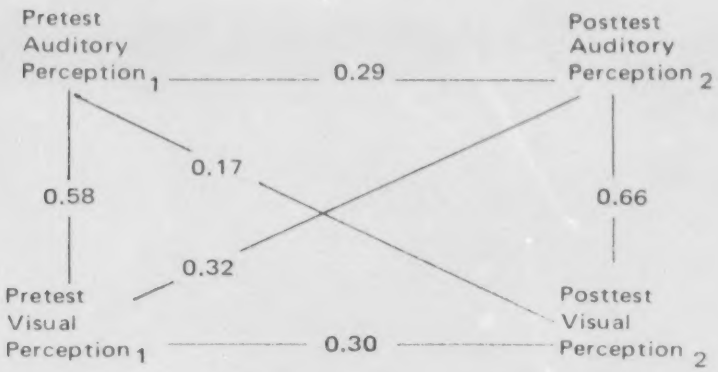


Figure 6.12

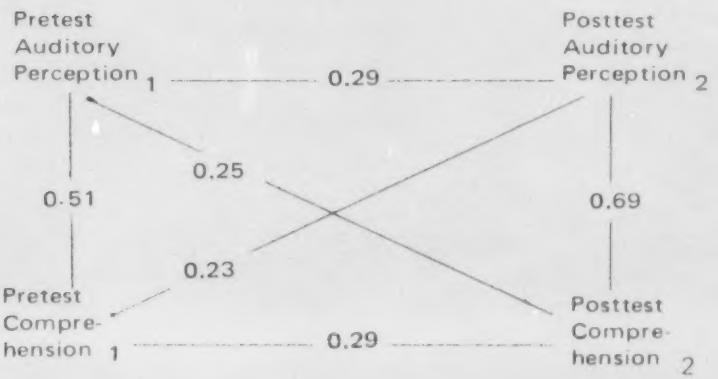
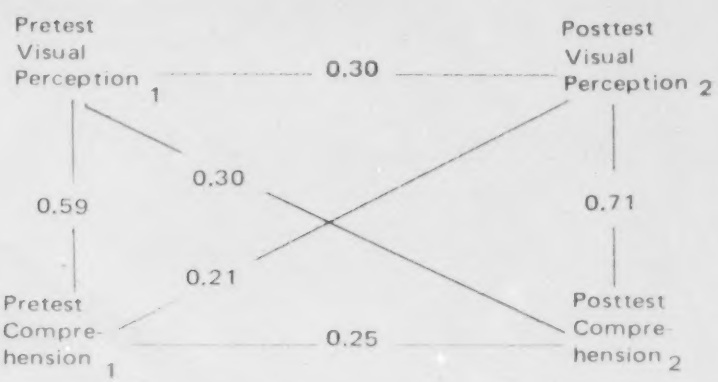


Figure 6.13



Second Grade Cross-Lagged Panel Correlations
(N=769)

Figure 6.14

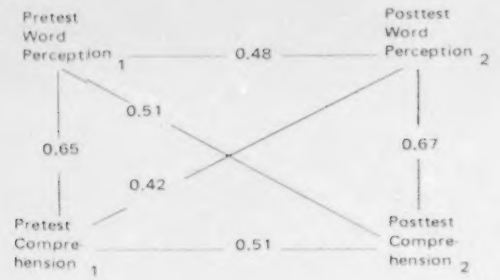


Figure 6.15

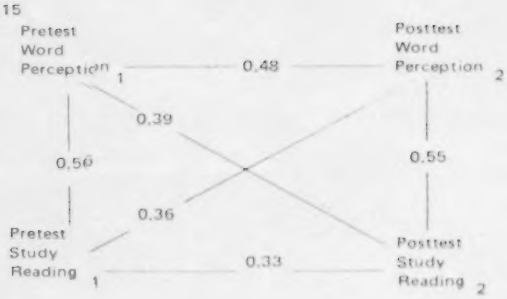
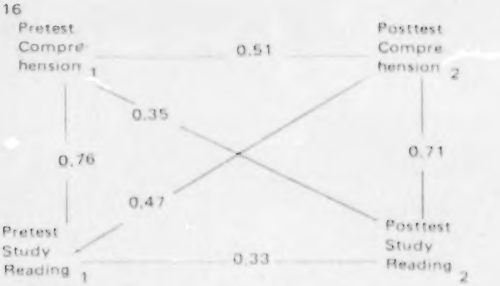


Figure 6.16



Figures 6.17 and 6.18 summarize the important causal relationships for first and second grade PRT scores, respectively. Figure 6.17 illustrates that Visual Perception, which involves discerning differences in shapes and pictures and matching letter forms with word forms, operates as a causal influence on Auditory Perception and Comprehension Development. At the second grade level, Word Perception and Study Reading operate as determiners of Comprehension and Interpretation.

One characteristic which Visual Perception, Word Perception, and Study Reading hold in common is that they require abstract spatial manipulations and the identification of embedded figures and concepts. It may be inferred that these types of activities should be given major emphasis in first and second grade reading programs and, conversely, that the emphasis on atomization of each and every reading subskill should be severely questioned. Successful readers do not learn to read by acquiring, in a stepwise fashion, the hundreds of subskills which comprise most of the popular commercial reading systems. Rather, they learn in giant steps through mastering spatial relationships and learning to decipher embedded figures in the form of letters, words, and sentences. Reading is a Gestalt which is far more than the sum of its coincident elements. By breaking the

Figure 6.17

Summary of Causal Relationships for First Grade PRT Subtests

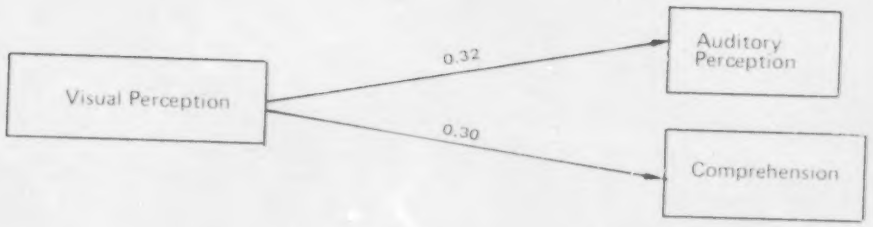
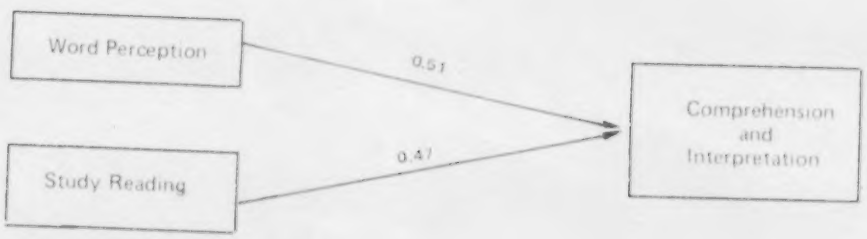


Figure 6.18

Summary of Causal Relationships for Second Grade PRT Subtests



reading process down into finer and finer elements, its Gestalt is destroyed and with it the child's opportunity to grasp the whole.

If the cross-lagged panel data is accepted as truth, the instructional implications are far-reaching. First, the emphasis on teaching the numerous subskills, which experts say comprise reading, may be misplaced. First graders should be given extensive encounters with tasks in visual discrimination of increasing complexity, including practice in locating embedded figures of all kinds (such as activities which require separating figures from background). Concrete word experiences should take precedence over language-based experiences in the sense that new material and concepts are presented initially through the visual mode. At first, this recommendation might appear to conflict with the observation that large numbers of Title I students have linguistic problems and should be given additional language instruction. It seems likely that the only common framework for the first grade Title I students and their teachers is the visual world. The verbal worlds of teachers and students are laced with inconsistencies and syntactical and dialectical differences. Often Title I children falsely perceive the words spoken by the teachers. However, if the children can view a concrete representation or, in terms of even greater instructive effectiveness, can manipulate a model of the concept, then the language takes on a vivid, meaningful quality. Thus, language is not relegated to a secondary position; rather, it is used to enrich what has already been presented visually. Language without prior concrete experience is just a meaningless collection of words.

Second graders should be given much more practice in abstract spatial manipulations and detecting embedded figures than is the case in the present instructional scope and sequence. Emphasis on comprehension and interpretation appears to be misplaced if the child does not possess a solid foundation in word perception and study reading skills. The approach suggested above represents a somewhat radical departure from traditional reading theory. Implicit in this departure from convention is a gamble. It is recommended that a carefully controlled pilot study be initiated. The pilot study curriculum would abandon the standard sequence of reading skills in favor of a curriculum oriented toward spatial and embedded figures. The gamble is that the approach might not work, and two years of skill building for participating children would be forfeited. The evidence of this study and reinforcement research, conducted by William Crano and his colleagues at Michican State University, suggests that the benefits of such a new strategy will be tremendous (Crano and Johnson, 1976).

Two considerations are worth reiterating. First, because these findings have implications beyond the Title I program, it might be appropriate for the District to recognize a pilot study as a necessity. This would give it both the required high level backing and the resources to launch a credible test of the approach. Secondly, the PRT and PMT data for the past two years offer a treasure of insights into ways of improving instruction in reading and mathematics. The results cited in this report represent only a fraction of the full range of analysis options and possible information yield.

The Criterion-Referenced Test/Norm-Referenced Test Controversy*

Much has been written in the past ten years on the relative advantages of the use of criterion-referenced tests (CRTs) over norm-referenced tests (NRTs). Greco (1974) traces the CRT movement to an article by Glaser (1963) on learning outcomes in which that author draws the following distinction:

- Criterion-referenced measures indicate the content of the behavioral repertory and the correspondence between what an individual does and the underlying continuum of achievement.

- Norm-referenced measures tell that one student is more or less proficient than another but do not tell how proficient either of them is with respect to the subject matter tasks involved.

Popham and Husek (1969) suggest that the two types of tests differ in how they are used:

- Criterion-referenced measures are used to ascertain an individual's status with respect to some criterion or performance standard.

- Norm-referenced measures are used to ascertain an individual's performance in relationship to that of other individuals on the same test.

In a more recent article, Popham (1974) distinguishes CRT and NRT measurement in terms of the "quality of description." He states:

> The overriding distinction between norm-referenced and criterion-referenced achievement tests is the quality of description yielded by the two approaches. In

*The authors recognize the study by Glenn E. Roudabush entitled, "Estimating Normative Scores From a Criterion-Referenced Test," as the immediate predecessor of and partial inspiration for this substudy.

> the case of norm-referenced tests, we have only a general idea of the skill area the test assessed (e.g., reading comprehension), plus an examinee's relative standing in relationship to other examinees' scores. With a criterion-referenced test, we can get a precise fix on what an examinee can or cannot do.*

For a time, it appeared that the proponents of CRT measurement might triumph completely as one large school system after another abandoned NRTs in favor of either commercially available or custom-developed CRTs. The arguments for CRTs took several forms. For example, norm-referenced tests are inappropriate for diagnosing individual student needs because these instruments do not measure all the important skills at a particular grade level. They focus instead on a small sample of these abilities with often only one item acting as an indicant for a given aptitude or objective. CRTs, on the other hand, are keyed to the curriculum and provide the classroom teacher with information on individual skills or objectives attainment; these tests are normally viewed by the classroom teacher as being more useful in planning an instructional program. Another argument is that normative data is most reliable and valid for evaluating program effectiveness where data is aggregated across a number of students. This type of statistical information is much too gross to use as an indicator of individual student achievement. Proponents of various teaching strategies, such as individualized instruction, argue that the purpose of CRT measurement is to evaluate innovative programs.

Although there remains considerable disagreement as to the relative advantages of NRTs and CRTs, a general consensus exists on at least two points. First, the informational needs of teachers are better served by well constructed, field tested, criterion-referenced tests. Second, the needs of program administrators, board members, legislators, and the general public are at least partially served by norm-referenced tests. In an effort to meet both levels of information required, many school districts, including Washington, D.C., employ both NRTs and CRTs. This approach appears to be logical and appropriate. Two types of information are needed, so two types of tests are given.

An interested observer might ask why test publishers have not simply normed a CRT, thereby creating an "NRT-CRT" and solving the problem. First of all, nationally norming an achievement test can cost as much as one million dollars. Also, test publishers are not anxious to create one product which would render existing CRTs and NRTs obsolete. Norming CRTs can create another problem. One attraction of criterion-referenced tests rests in the fact that local school districts can build their own instruments. This is exactly what many big cities have done, either singly or in collaboration with testing corporations. Thus, for a number of political, economic, and not very persuasive methodological reasons (refer to Hambleton and Novick, 1973; Messick, 1974), test publishers have considered norming existing criterion-referenced tests on a national basis.

Much of the argument over CRTs and NRTs rests on what may be a faulty premise: that NRTs and CRTs measure something different in terms of both content and specificity. If the contents of the two types of tests actually differ, and if both normative and criterion-referenced information are required, then no solution to the dilemma exists short of giving both types of examinations. However, there is reason to believe that a norm-referenced reading test, such as the CTBS, addresses the same general content as a criterion-referenced reading instrument, such as the PRT. In this case the primary difference between the two tools is one of specificity.

It is realistic to hypothesize that a well constructed criterion-referenced instrument differs from a norm-referenced test only with respect to the methods by which individual performances are reported. A student's result on a CRT is described in terms of item or objective mastery; for

*David A. Kenny, "A Quasi-Experimental Approach to Assessing Treatment Effects in The Nonequivalent Control Group Design," *Psychological Bulletin*, Vol. 82, No. 3, (1975), 345-362.

example, either students can recognize silent letters in a word or they cannot. The question of interest is not how many students across the nation at the same grade level can recognize silent letters; rather, it is whether a particular student can recognize silent letters.

A student's performance on an NRT is reported in terms of relative standing as compared to the national norm. Here the question of interest is whether the student is reading at a level commensurate with students of similar age and experience. CRT information is reported in terms of objective mastery, whereas NRT results are given in terms of national percentiles or grade equivalents.

In other words, some CRTs and NRTs have no informational differences; other tests of this kind have differences which are clear and significant. The argument over which is "better" is based exclusively on how the results for an individual student should be reported. One way to decide whether the NRT currently used by the D.C. schools actually overlaps the CRT is to determine whether a student's NRT score can be predicted using CRT objective mastery information.* The CRT data on each student would then be used to create a prediction equation capable of generating national percentiles and grade equivalents for individual students; this would obviate the high cost of administering NRTs to all students. If the prediction is accurate, then both teacher information and program evaluation needs can be adequately and equally served by administering only the CRT.

The tests used in this study were Form S, Levels B and C and Form T, Level 1 of the CTBS, the PRT, and the PMT. The CTBS subtests included Vocabulary, Reading Comprehension, Total Reading, Computation, Concepts and Application, and Total Mathematics. Objective mastery scores rather than subtest scores from the PRT and PMT were used in this study. Table 4.2 in Chapter 4 summarizes selected characteristics of each subtest. The study sample included 2,367 second graders for whom both CRT and NRT reading scores were available and 2,374 second graders for whom both CRT and NRT mathematics scores were available.

Table 6.8 summarizes the multiple correlations between CRT objectives and NRT scores. The correlations have been corrected for restriction in range of the NRT values. The magnitude of these correlations suggests that the CRTs and NRT are measuring very similar constructs. Given this level of similarity, it is possible to equate CTBS subtest percentile scores with corresponding subtest percentile scores of the PMT and PRT. The procedure for accomplishing an equipercentile equating of this type for the two tests was perfected by Educational Testing Service (ETS) and implemented on a large scale basis in what is known as the Anchor Test Study. A local percentile of 50 on a CRT for reading comprehension might translate into a national percentile of 35. Because the PMT-PRT and CTBS correlate highly, the tables would yield very accurate national norm equivalents of local norms. One result of developing equipercentile tables for the PMT and PRT, using the ETS procedure, is that money now expended for standardized testing could be targeted on improving the criterion-referenced scores.

Table 6.8

Multiple Correlations Between Criterion-Referenced Test Objectives and CTBS Scale Scores (N = 2050)

Criterion-Referenced Test Objectives	CTBS Reading	CTBS Language	CTBS Mathematics	CTBS Battery Total
	0.7605	0.6530	0.7319	0.6663

*The description of the CRTs in Chapter 4 of this report includes a listing of each objective measured by both the *Prescriptive Reading Test* and the *Prescriptive Mathematics Test*.

The evaluation team recommends that the Title I program utilize PMT/PRT results in place of conducting standardized testing for school year 1977-78. However, continued utilization of PMT and PRT results would be dependent upon necessary revisions by D.C. Public Schools and relevancy of the PMT and PRT to new program approaches such as Competency Based Curriculum (CBC). A study focusing upon the development of equipercentile tables for translating PMT and PRT scores into national norms, using the Roudabush or ETS procedure is recommended. Data for this study is now available on computer tape and could be completed in three months. The revised PMT and PRT would be capable of supplying both feedback to teachers on individual objective attainment *and* national norm scores for policymakers at the building and district-wide levels.

By way of summary, the above stated recommendation has two attractive features. First, there will be a fiscal savings, because only one test administration would be required. Second, no information would be lost because national norms for the 1976-77 Title I evaluation would be obtained from tables created with 1975-76 PMT, PRT, and CTBS matched files.

Standardized Growth Expectation: Some Findings and Implications

Most educational evaluations, including the present one, ignore what may be a critical factor when estimating whether a program has had an impact or whether students have learned more at one grade level than another. It is typically assumed that a treatment effect of seven NCEs (one-third standard deviation) has the same meaning in first grade as in seventh grade. What is not typically considered is that the expected growth is different in first grade and seventh grade. Another way of viewing the issue is to ask whether a student would lose the same amount (relative to national norms) in reading achievement if he/she fell asleep for all of first grade or all of seventh grade. This is the same as asking, how much growth does the average student make in reading achievement during first grade, and is it the same as the growth realized by the average seventh grade student?

An answer to the above question can be approximated by assuming that a student will attain the same *raw score* on the pretest and posttest if no learning has taken place. If the pretest raw score is equivalent to a national percentile of 50 and the same raw score is entered into the posttest percentile table, the resulting percentile score will be less than 50. The difference between the pretest percentile and the posttest percentile expressed in standard score form is referenced as the Standardized Growth Expectation (SGE). The SGE is the amount that a student learns over a period of time or, conversely, what the student would lose if he/she fell asleep and learned nothing. An example may help to clarify the computation procedures used to calculate SGEs. Table 6.9 presents a raw score to percentile conversion for beginning of first grade and end of first grade on the Total Reading scale of the CTBS/S. The average (50th percentile) beginning first grade student attains a raw score of 31 on Total Reading. Under the assumption that the average student learns nothing in the first grade, he/she would be expected to again obtain a raw score of 31 on the posttest. Whereas a raw score of 31 is equivalent to a beginning first grade percentile of 50, it represents an end of first grade percentile of 9. If both percentiles are converted to NCEs (50 → 50; 9 → 21.8) and subtracted, the result is an SGE of 29.2. In other words, if a student falls asleep and learns nothing during the first grade, he/she would be expected to lose 29.2 NCEs because that is the amount of standardized

Table 6.9

Raw Score to Percentile Table for Beginning and End of First Grade on CTBS, Level B

Total Reading

Beginning of First Grade		End of First Grade	
Raw Score	Percentile	Raw Score	Percentile
73-84	99	84	99
86-72	98	84	98
65-67	97	84	97
61-64	96	84	96
59-60	95	84	95
57-58	94	83	94
55-56	93	83	93
53-54	92	82	92
52	91	82	91
31	50	59	50
31	49	58	49
31	48	58	48
31	47	57	47
31	46	56	46
30	45	55	45
30	44	54	44
30	43	53	43
30	42	53	42
30	41	52	41
20	10	32	10
19	9	31	9
18	8	30	8
18	7	29	7
18	6	28	6
18	5	27	5
17	4	25-26	4
16	3	24	3
15	2	21-23	2
0-14	1	0-23	1

growth exhibited by the national norm group during the first grade. Yet another way of viewing the SGE is to consider it as an estimate of the effect of school, home, and social forces (such as radio and television) on first grade students' reading achievement.*

Table 6.10 presents SGEs in reading and mathematics for grades 1, 2, 3, and 7. To facilitate comparison of information from the findings of this section with the rest of the chapter, all SGEs are presented as normal curve equivalents (X=50; S.D.=21.06). All SGEs in Table 6.10 are computed from the norms in the publisher's manual for the CTBS/S. The procedure used to compute SGEs is identical to that described in the paragraph above.

Table 6.10

Standardized Growth Expectations (SGEs) Expressed as NCEs in Total Reading and Total Mathematics for Grades 1, 2, 3, and 7

	Grade 1	Grade 2	Grade 3	Grade 7
Total Reading	29.2	9.3	8.7	3.7
Total Mathematics	21.8	12.3	11.7	3.2

The period of growth in each case is fall to spring of the school year. The 50th percentile point was used for entry into the pretest tables.

Table 6.10 reveals that the SGE for second grade Total Reading is only one-third of the SGE at the first grade level. Similarly, the second grade SGE for Total Mathematics is about four times larger than the SGE for grade seven. This seems to indicate that the rate of growth is different from grade to grade and, in particular, the rate slows with each additional year of schooling. The SGEs for height and weight computed from birth to eighteen years of age follow a similar pattern of deceleration. The largest SGEs appear during the first few years of life and gradually diminish until eighteen years of age when the SGE is less than one NCE point.

As pointed out earlier, Title I evaluations assume that an NCE gain, or treatment effect, of seven points means the same thing if it occurs in the first grade or the seventh grade. The assumption is that it is just as difficult to improve a first grade treatment group by seven NCEs as it is to improve a seventh grade treatment group by seven NCEs. An examination of Table 6.10 suggests that a gain of seven NCEs in Total Mathematics at the seventh grade level represents a 200 percent increase in achievement rate, whereas the same seven point gain at the first grade represents a 33 percent increase in achievement rate. The question arises as to whether achievement rate expressed in SGEs must be considered in interpreting a treatment effect. If all the impact of school, community, home, and social forces can only cause a Total Reading SGE of 3.7 NCEs for the average seventh grader nationally, then is it fair to expect a Title I program to show a treatment effect of seven NCEs above and beyond the SGE of 3.7? Perhaps the ratio of treatment effect to SGE would provide a more comparable index across grades, tests, and subtests. When the SGE is considered, a number of difficult questions arise regarding the meaning of treatment effect and the wisdom of aggregating across either grades or tests. At the present time not enough is known to judge the value of the SGE as a statistic for communicating treatment effects in a comparable unit. A special report is forthcoming that will present this new concept in more detail and, hopefully, discuss the contributions, if any, that the SGE promises to make to evaluation methodology.

*The SGE differs slightly depending upon where in the pretest distribution the raw score is selected to be entered into the posttest percentile distribution. For ease of presentation, this difference is ignored since it does not influence the general conclusions.

Conclusion

Table 6.11 summarizes the treatment effect in Total Reading and Total Mathematics as documented by the norm-referenced and control group models. It is interesting to note that the two models yield similar estimates of treatment effect for first grade reading and mathematics achievement, but substantial differences in treatment effect are evident at second and third grade. The fact that all assumptions of both the norm-referenced and control group models were met at the first grade level generated confidence in the accuracy of these estimates of treatment effect. The widely divergent estimates for second grade and the moderately similar estimates at third grade suggest that both models may be highly sensitive to the types of assumption violations which are encountered in typical applications of these two models. It seems plausible that when low achievers in a class are

Table 6.11

Summary of Treatment Effects (in NCEs) at Grades 1, 2, and 3 for Total Reading and Total Mathematics

	Total Reading			Total Mathematics		
GRADE	1	2	3	1	2	3
Norm-Referenced Model Estimates of Treatment Effect	3.9	9.9	3.1	6.2	8.1	7.9
Control Group Model Estimates of Treatment Effect	5.5	2.0	2.3	6.7	0.9	3.0
Average Effect	4.7	6.0	2.6	6.5	4.5	5.5

removed for one to two hours per day of special laboratory instruction, the remaining group can progress at a faster pace. This is because the student/teacher ratio is lowered and because the group is academically more homogeneous. Also, the likelihood is that equipment, materials, and teacher inservice (bought by Title I funds) benefit all students in the class. It becomes clear that non-Title I students are receiving a "treatment" by virtue of the fact that Title I students obtain project services. Although the full magnitude of this unexpected, positive outcome is not yet known, this year's findings confirm that non-Title I students are achieving much better than would be expected from their pretest scores. A fuller treatment of the results supporting this finding will be forthcoming in a special report.

One puzzlement continues and should be given extended treatment in next year's evaluation. Why do Title I students do so well in the D.C. Title I program and then lose a major portion of their newfound advantage over the summer? This phenomenon is nation-wide and should not be considered an anomaly of the D.C. program. However, its widespread appearance does not reduce local responsibility for finding an explanation.

CHAPTER VII. SELF CONCEPT DEVELOPMENT

In a declaration of the significance of self concept development, Purkey (1970) wrote: "For generations wise teachers have sensed the significant and positive relationship between a student's concept of himself and his performance in school."[7.1] Combs and Snygg (1959) placed self concept at the forefront of their theory. They stated: "The most important complex of differentiations in the individual's perceptual field is his phenomenal self. What a person thinks and how he behaves are largely determined by the concepts he holds about himself and his abilities."[7.2] The last decade has witnessed a resurgence of interest in understanding the ways in which children feel about themselves and others, as well as an increased recognition of the relationship between these feelings and academic performance. The Washington, D.C. Title I program has embraced self concept development as one of its major objectives. This chapter explores some of the relationships among self concept, student achievement, and classroom behavior.

Rogers (1951) provides an excellent definition of self concept which is compatible with the way in which this construct was conceptualized and measured in the present evaluation:

> The self concept or self structure may be thought of as an organized configuration of perceptions of the self which are admissible to awareness. It is composed of such elements as the perceptions of one's characteristics and abilities; the percepts and concepts of the self in relation to others and to the environment; the value qualities which are perceived as associated with experiences and objects; and goals and ideals which are perceived as having positive or negative valence.[7.3]

Between the ages of five and twelve self concept begins to crystallize. During this period (termed the latency period by many authors) the child matures considerably in the physical, cognitive, and affective areas.[7.4] He/She confronts the environment with an increasingly stable set of feelings, attitudes, and behaviors which are based, to a large extent, on his/her self concept which is likewise stabilizing. With increasing age, the child becomes more sure of likes and dislikes; both enjoyable and unpleasant pasttimes; and personal perceptions of and plans for the future. The child begins to plan, and aspirations and hopes tend to be consistent with the way in which he/she values himself/herself, which, in turn, is dictated in large part by the perceived values of others regarding him/her.

Although the early school years are characterized by a crystallization of self, the child also begins to differentiate.[7.5] The self concept of the five-year-old is a relatively simple construct. The five-year-old views most things as a dichotomy: people are nice or ugly, food tastes good or bad, places are happy or unhappy places to be, other children are friendly or mean. As the six-year-old enters first grade, new demands arise. He/She is expected to interact with unfamiliar children and authority figures and, to a great extent, a sense of well being is determined by how successfully these new demands are negotiated.[7.6] It is these early school years which have a truly profound impact on the child's self concept development: never before has he/she been consistently, objectively, and sometimes coldly judged by peers and adults. There is an inability to separate oneself from one's actions, so that reprimands and criticism often become viewed as direct threats to self. With this background information we now turn to the respective correlates of a positive and negative self concept.

A positive self concept helps children confidently solve daily problems. It leads to a wholesome and facile handling of personal relationships and their resultant mutual interdependencies. A strong self concept also allows children to handle growth toward the state of conceptual independence that is fundamental to the painful journey to intellectual adulthood. As they develop and refine their positive self-images, the children progressively gain a sense of their value to the happiness and growth of those people who inhabit their particular microcosms. Their worlds are rich in the

apportionment of love and attention, and this richness reinforces their desire to respond actively and positively to other people.

Children with this healthy orientation do not feel inferior to or intimidated by their peers. They translate the authoritative communications of teachers and parents into helpful and attentive statements of instruction, concern, and love. They are capable of accepting constructive criticism without a resultant threat to their individuality, independence, or reliability. Fortified with the continual input of positive perceptions, the children naturally respond well to challenges. They are not tormented by the feelings of fear, apprehension, harassment, timidity, and exhaustion that affect children who are not supported by a positive self concept. Their confidence and psychological tranquility are reflected by a satisfaction with their personal appearance. They do not suffer from anxieties concerning physical attractiveness.

Occasionally doting on their ability to surpass their peers in certain activities, the children with the strong self-images consider themselves equal to their cohorts in most performance areas. When they do perform below their own standards in a routine activity, their expressions of unhappiness are not extreme. They are usually moderate in their self-praise. They use their pride in accomplishment to bolster their already abundant supply of self confidence. They are aware of the disadvantages of anti-social behavior. Conversely, they are cognizant of the benefits of socially accepted actions and interactions. Honest and open enough to face the fact that they may have problems with handling both people and situations, these children have no need to protect themselves from the possibility of committing an error. They are not forced to build bastions around brittle self-images.

Seldom indulging in antisocial behavior, children with positive self concepts usually resort to overly aggressive solutions to problems only in peculiar situations. They are often competitive and sometimes assertive, but they avoid fighting with their peers. Their sense of scholastic competitiveness is keenly developed, and they often excel in the basic areas of reading and mathematics. They regularly exceed their performance expectations, as calculated from ability examinations, to make outstanding scores on standardized achievement tests. Basking in the pleasant glow of academic success, these students see school as a constructive and rewarding influence on their lives.

The children with poor self concepts live in a troubled world. They see themselves "through a glass darkly." Unsure of their ability to solve daily problems, they allow their quandaries to influence many of their relationships with other people. They may be too passive, dependent, or withdrawn in their interpersonal involvements. Conversely, they may intersperse elements of unfriendliness and incompatibility in their behavioral projections to other people. Their weakened self concepts prevent them from successfully functioning as individuals, while hindering their smooth development of conceptual and moral integrity.

A poor self concept leads to unpleasant and inconsiderate thoughts and actions. Children with low opinions of themselves will reinforce these low opinions with consistently unruly behavior. This will persuade the people in their immediate world that they are, indeed, uncomfortable companions. They reject themselves and others and, naturally enough, feel that other people have little liking for them. Often they are convinced of their inability to compete with their peers. The poor self concept undermines their confidence in their ability to communicate constructively with adults and authoritative figures. These children are threatened when they should be stimulated and discouraged when they should be reassured. Group activities further convince them of their problems in confronting their daily routines.

Children with weak self concepts often prefer to interact with friends of a younger age group. In this way, they feel justified in assuming a leadership role. Their rowdy impulses are tempered by a contradictory desire to find some moderate social success without resorting to misbehavior. Thus, a child who usually prefers to play alone may seek to dominate a younger child or group of children. However, in most situations, the children with poor self concepts are quitters and underachievers.

They protect themselves from criticism through a refusal to admit error, but they consistently perform poorly to solidify and consolidate their negative self concepts. Their response to praise is often confused, as the approval disturbs their flow of negative thoughts about their own capabilities.

Physical manifestations of their inner difficulties often cause them to be considered problem children. Belligerent or withdrawn children both cause extra problems for their teachers and other supervisors. The symptoms are different but the catalytic common denominator for their actions is the poor self concept. These children usually retreat in the face of the challenge of normal reading and mathematical assignments. They often earn lower scores on their standardized achievement tests than is expected with reference to their results on ability tests. For them, school is just another place to suffer the frustrations of defeat and failure.

SELF CONCEPT INSTRUMENTATION

The *Self Observation Scales* (SOS) used in the present evaluation is a direct, self-report, group administered, nationally normed, and standardized instrument with empirically determined scales which measure the ways in which children perceive themselves and their relationships to peers, teachers, and school (Stenner and Katzenmeyer, 1973). Briefly, the SOS has been developed to measure factor analytically derived dimensions of children's affective behavior. Four such dimensions (Self Acceptance, Social Maturity, School Affiliation, and Self Security) at a primary level and eight dimensions (Self Acceptance, Self Security, Social Confidence, Self Assertion, Family Affiliation, Peer Affiliation, Teacher Affiliation, and School Affiliation) at the junior high level have been shown to be useful in predicting important aspects of children's development. Some of these scales mark well known dimensions of children's behavior. For example, Self Security is actually the inverse of trait anxiety and has been the focus of research for a number of years. School Affiliation, Teacher Affiliation, and Peer Affiliation represent constructs which educators have long used in describing children. Social Maturity and Social Confidence are somewhat innovative notions and have not received much attention in self concept research.

The primary level (Form C) of the SOS is designed for use at grades K-3. Each of the four scales at this level is labeled in a positive manner, with high scores being most characteristic of the label. Below are descriptions of each scale.

Scale I. Self Acceptance

Children with high scores view themselves positively and attribute to themselves the qualities of happiness, importance, and general competence. These children see themselves as important to other people, including authority figures and their peers. Children with low scores view themselves as inadequate, unsuccessful, and undesirable. They do not see themselves as happy, and they view themselves as relatively unimportant to authority figures and their peers. Three items which reflect the values of this scale are:

- Do the other children in the class think you are a good worker?
- Are you good-looking?
- Do you feel good about yourself most of the time?

Scale II. Social Maturity

Children with high scores view their relationships and interactions with other people (especially peers) positively. They view themselves as independent, persistent, and sensitive to the needs and feelings of others. Children with low scores view themselves as quitters and loners. They see themselves as wanting to dominate in peer situations; however, they actually would prefer to be alone. Low scores reflect an uncertainty in social interactions. Three items highly descriptive of this scale are:

- Do you like to play only when you are the leader?
- Do you always want to be first in line?
- Do other children do things better than you?

Scale III. School Affiliation

Children with high scores view school as a positive influence in their lives. They enjoy going to school and enjoy the activities associated with school. Children with low scores view school as an unhappy place to be. They do not enjoy most school-related activities and are negative about the importance of school in their lives. Three items highly descriptive of this scale are:

- Do you like to come to school every day?
- Is School a happy place?
- Do you like to stay home from school?

Scale IV. Self Security

Children with high scores report a low level of anxiety and a high level of emotional stability. These children view themselves as being in harmony with people around them, and they are confident about new experiences and their ability to perform adequately. Low scoring children report being anxious, depressed, and unsure of themselves. New experiences tend to be anxiety provoking, stemming from the children's uncertainty about their ability to perform. Three items highly descriptive of this scale are:

- Do you get nervous at school?
- Do you feel lonely very often?
- Do you worry about a lot of things?

The junior high level of the SOS is designed for use at grades 7-9. Form C has 72 items measuring seven dimensions of student affective behavior.* Each scale is labeled in a positive manner with high scores being most characteristic of the label.

*Form A, with eight scales, provides a measure of Family Affiliation. This scale is not addressed by Form C, the form of the SOS used in this evaluation.

Scale I. Self Acceptance

Students with high scores view themselves positively and attribute to themselves qualities of basic competence, self satisfaction and happiness. They see themselves as performing well in a lot of activities and as possessing confidence in their future success. Students with low scores are unsatisfied with their performance and capabilities and are unsure of their futures. Three items highly related to this scale are:

- I do a lot of things well.
- I think I will be successful in life.
- When I look in the mirror I like what I see.

Scale II. Self Security

Students with high scores report a high level of emotional confidence or stability. They report being in control of factors affecting their lives and worry very little about either specific or nonspecific fears. Students with low scores on this scale worry a great deal. They report nervousness about nonspecific performance expectations and often feel that they worry more now than in the past. Three items highly related to this scale are:

- I often find myself worrying about something.
- At times I lose sleep over worry.
- I worry about losing my friends.

Scale III. Social Confidence

Students with high scores on this scale express confidence in their abilities to relate in social situations and to make and keep friends. They believe that other people value their friendship. Students with low scores have difficulty making friends and lack confidence in social situations. Three items highly related to this scale are:

- People who are like me don't have a good chance to be successful.
- Most of my friends don't care what I think.
- If people knew what I am really like, they would steer clear of me.

Scale IV. Self Assertion

Students with high scores view themselves as possessing leadership qualities and as being respected by others for possessing these qualities. The emphasis on this scale is on how students believe others view them. Students with low scores see themselves as lacking leadership ability and assertiveness. Three items highly related to this scale are:

- Other students look to me for leadership.

- Other students look to me for ideas.
- In discussion with my friends, my point of view usually wins.

Scale V. Peer Affiliation

Students with high scores on this scale consider their relationships with other students to be both of high quality and of considerable importance to them. They see themselves as approved of and valued by their peers, and they like to be with other students. Students with low scores do not see their peer relationships as an asset. They view other students as unfriendly, do not accept the responsibilities of friendship easily, and have few friends. Three items highly related to this scale are:

- I make friends easily.
- Other students are usually fair to me.
- I can count on my friends when I am in trouble.

Scale VI. Teacher Affiliation

Students with high scores on this scale like their teachers. They see the teacher as helpful, attentive, understanding, and generous. Students with low scores see the teacher as arbitrary, inconsiderate of children, and as a source of emotional pain. Three items highly related to this scale are:

- My teachers like to help me.
- When I do something wrong, my teachers correct me without hurting my feelings.
- My teachers expect too much of me.

Scale VII. School Affiliation

Students with high scores view school positively, enjoy going to school, and enjoy the activities associated with school. Students scoring low on this scale see school as a "hassle" that keeps them from doing what they want to do. Three items highly related to this scale are:

- I like to stay home from school.
- This school is like a jail.
- School frequently keeps me from doing what I want to do.

RESULTS

Table 7.1 presents the selected characteristics of the 9,132 students for whom both *Student Information Forms* and SOS results were available. As can be seen from Table 7.1, only Title I seventh graders were tested with the SOS; in grades K-3 both Title I and non-Title I students were tested. Since non-Title I seventh graders were not tested, the major focus of this chapter will be on students in grades K-3. Throughout this chapter results for males and females are combined for ease of presentation; this is possible because only small, insignificant differences were found between the SOS profiles of males and females.

Table 7.1

Sample Distribution of the 9132 Students Responding to the Self-Observation Scales (SOS)

	GRADE LEVEL							
	Kindergarten		First		Second		Third	
	Males	Females	Males	Females	Males	Females	Males	Females
Non-Title I	53	54	438	514	416	476	329	404
Title I	378	394	987	816	927	753	821	728
Total	431	448	1425	1330	1343	1229	1150	1132

SELF CONCEPTS OF TITLE I AND NON-TITLE I STUDENTS

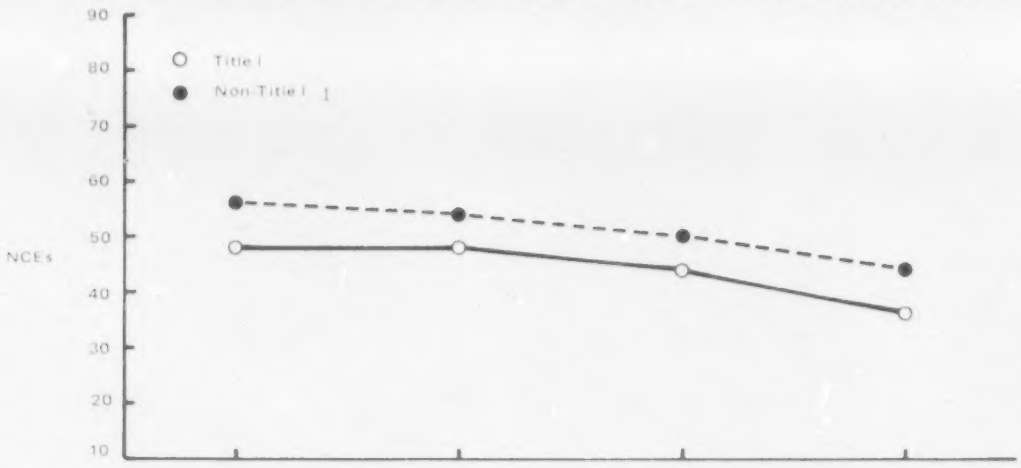
Figures 7.1, 7.2, 7.3, and 7.4 summarize the SOS scores for Title I and non-Title I students across the primary grades. Several differences between Title I and non-Title I students on the Self Acceptance, Social Maturity, and Self Security scales are significant.* In general, the students in Title I schools are near the national norm of 50 on Self Acceptance, School Affiliation, and Self Security. These results point out several assets possessed by Title I students. The typical Washington, D.C. Title I student enjoys school to a greater extent than his/her more advantaged peers. He/She evidences less anxiety than the national norm and feels relatively more accepting of him-/herself. The lowest scores for both Title I and non-Title I students appear on the Social Maturity scale.

The trends across grades for the SOS scales provide some insight into the socialization process and its effects on children. The Self Acceptance scores (Figure 7.1) drop an average of slightly over one-half standard deviation for both Title I and non-Title I students over the primary grades. This loss may be one concomitant of the frustration discussed later in Chapter 9. Repeated failure at anything eventually translates into feelings of self doubt. Increasing self doubt and criticism are at the root of depressed Self Acceptance scores. Our society places tremendous emphasis on academic success. It is little wonder that young children begin to equate their self worth with how well they measure up to authority figure expectations.

*All scores are presented in normal curve equivalents (NCEs).

Figure 7.1

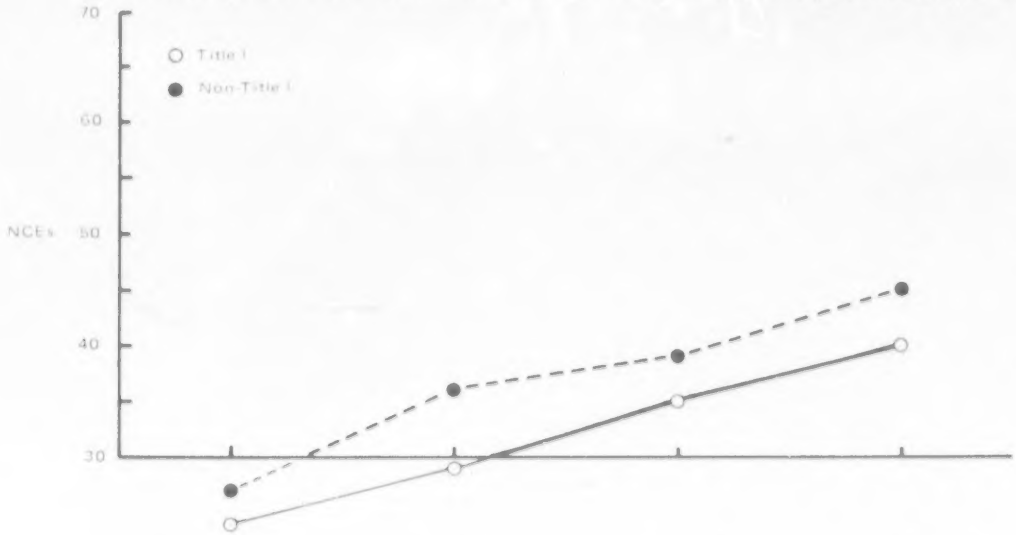
Mean NCE Scores for Title I and Non-Title I Students on the SOS Self Acceptance Subscale by Grade Level



	Kindergarten		First Grade		Second Grade		Third Grade	
	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I
X	49	53	49	52	47	50	43	47
S.D.	15.6	14.2	16.8	16.3	17.6	17.7	18.5	19.5
N	772	107	1896	955	1684	894	1555	735

Figure 7.2

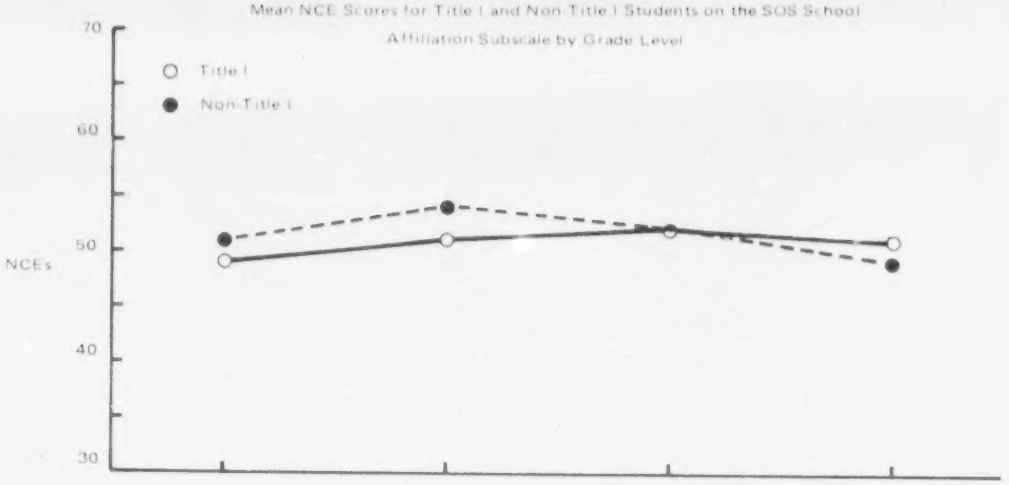
Mean NCE Scores for Title I and Non-Title I Students on the SOS Social Maturity Subscale by Grade Level



	Kindergarten		First Grade		Second Grade		Third Grade	
	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I
X	24	27	29	36	35	39	40	45
S.D.	16.2	16.7	17.4	18.6	18.3	18.5	19.2	18.3
N	772	107	1806	955	1684	894	1555	735

Figure 7.3

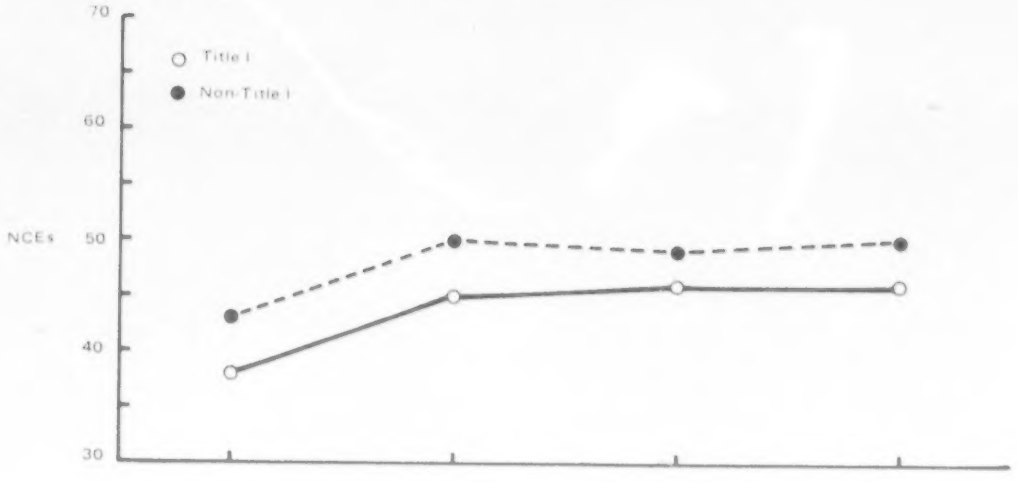
Mean NCE Scores for Title I and Non-Title I Students on the SOS School Affiliation Subscale by Grade Level



	Kindergarten		First Grade		Second Grade		Third Grade	
	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I
$\bar{X}$	49	51	51	54	52	52	51	41
S.D.	16.5	15.5	18.1	17.5	19.0	20.2	20.2	21.9
N	772	107	1806	955	1684	894	1555	735

Figure 7.4

Mean NCE Scores for Title I and Non-Title I Students on the SOS Self Security Subscale by Grade Level



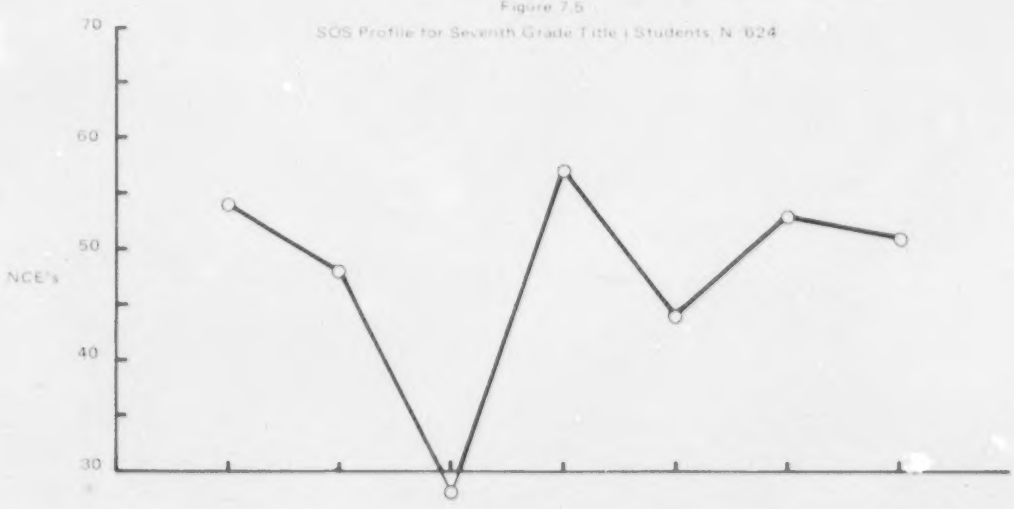
	Kindergarten		First Grade		Second Grade		Third Grade	
	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I	Title I	Non-Title I
$\bar{X}$	38	43	45	50	46	49	46	50
S.D.	19.2	20.1	17.4	[illegible]	16.7	17.1	17.7	17.8
N	772	107	1806	955	1684	894	1555	735

The Social Maturity scores (Figure 7.2) show a dramatic increase over the primary grades. Washington, D.C. kindergarten students in Title I schools are more than one standard deviation below the national norm. Stated another way, only 16 percent of kindergarten students exceed the national norm. The scores for kindergarten and third grade students on the Social Maturity scale differ by 16 to 18 points relative to the norm, with the third grade scores higher than those for kindergarteners. In the case of non-Title I third grade students, the average score is within 5 points of the norm. These low Social Maturity scores in the early school grades suggest one possible explanation for the substantial incidence of withdrawn and aggressive behavior. Of course, one of the things which all children gain by attending school is "coping behavior." They become "socialized" according to the dictates of our culture and, thereby, increasingly skilled in interpersonal dealings. Additionally, young students can be exposed to even more culturally enriching experiences which will enhance such skills. The socialization process can be accelerated through greater interaction with helpful and attentive adults.[7.7] Effective educators would never discipline a second grade student for failing to read a passage properly; rather, this type of teacher would identify the skill areas in which the student was deficient and provide the needed instruction. Throughout the diagnosis and instruction, the teacher's attitude would likely be supportive and positive.

Contrast the above teaching behavior with what happens when the second grade student breaks into the front of the line, starts a fight with another student, or repeatedly fails to follow simple instructions. In these instances the teacher is likely to discipline the student in some way, under the assumption that the student knows better and is "just trying to be difficult." The low Social Maturity scores suggest that Title I students in particular do not possess the social skills or knowledge to negotiate many social interactions successfully, any more than they possess the skills required to read. To discipline a student with very low social maturity for breaking into line is equivalent to disciplining a student for an inability to read.

One reason for the two different approaches to dealing with academic behavior and classroom behavior is that teachers typically do not view one of their roles as that of instructor in the social skills. Elementary school teachers are increasingly being held accountable for reading and mathematics achievement. Few would dispute the fact that basic skills instruction is their number one priority. Behavior problems precipitated by low social maturity are viewed by most teachers as a

Figure 7.5
SOS Profile for Seventh Grade Title I Students, N=624



	Self Acceptance	Self Security	Social Confidence	Self Assertion	Peer Affiliation	Teacher Affiliation	School Affiliation
$\bar{X}$	54	48	28	57	44	53	51
S.D.	15.7	17.1	15.8	18.8	16.4	15.2	20.2

hindrance and an obstacle to effective teaching. The dramatically depressed Social Maturity scores indicate that primary grade students in Title I designated schools have a need to learn and practice reading skills. It should be readily apparent that if the social skills could be improved, a major obstacle to achievement in reading and mathematics could be removed.

The average scores for School Affiliation are consistently at or above the national norm. The profile indicates relatively little change in score across grades. With the exception of kindergarten, in which the scores are depressed, indicating higher anxiety than the norm, the Self Security scores are average for non-Title I students and four to five points on the average below the norm for Title I students. The seventh grade profile depicted in Figure 7.5 shows peaks above the national norm for Self Acceptance, Self Assertion, Teacher Affiliation, and School Affiliation; a somewhat depressed Peer Affiliation score; and a very low Social Confidence score.

RELATIONSHIPS BETWEEN SELECTED STUDENT CHARACTERISTICS AND SOS SCORES

Although the question of causality remains unanswered, it is useful to examine the self concepts of students with various backgrounds and behavior characteristics. In addition to providing construct validation for the measures employed, such information increases our knowledge of the Title I child and his/her needs.

Figures 7.6, 7.7, 7.8, and 7.9 give the SOS profiles across the primary grades for students nominated by their teachers as being withdrawn, somewhat withdrawn, and not withdrawn. Withdrawn students are significantly below their age peers who were not categorized as being withdrawn on Self Acceptance, Social Maturity, and Self Security. Interestingly, at the kindergarten level only Self Security serves to distinguish withdrawn from nonwithdrawn students, whereas by third grade all four SOS scales show withdrawn students as scoring below nonwithdrawn students.

Figures 7.10, 7.11, 7.12, and 7.13 illustrate the differences between students categorized by their teachers on the extent to which they voluntarily participate in classroom activities. As can be seen, the differences between students who volunteer frequently and those who voluntarily participate rarely are dramatic. The frequent participators score, or the average, more than 10 NCE points above the infrequent participators on Self Acceptance, Social Maturity, and Self Security. The differences on School Affiliation are similar in direction to those on the other scales, though not as dramatic. It is probable that students who actively participate in class are more likely to be praised than those who do not participate. Since self concept arises from our perceptions of the way others value us, praise or the lack of it can have a substantial effect on self concept development. These evaluation results shed some light on how pervasive this effect can be.

Figures 7.14, 7.15, 7.16, and 7.17 present the SOS profiles for students with four levels of teacher-rated need of Title I services. The evidence is strong indeed that great need for Title I services goes hand in hand with a depressed self concept. Conversely, students with no need for Title I services evidence positive self concepts. These differences hold for all students in kindergarten through third grade, with the largest differences evident on the Self Acceptance and Self Security scales.

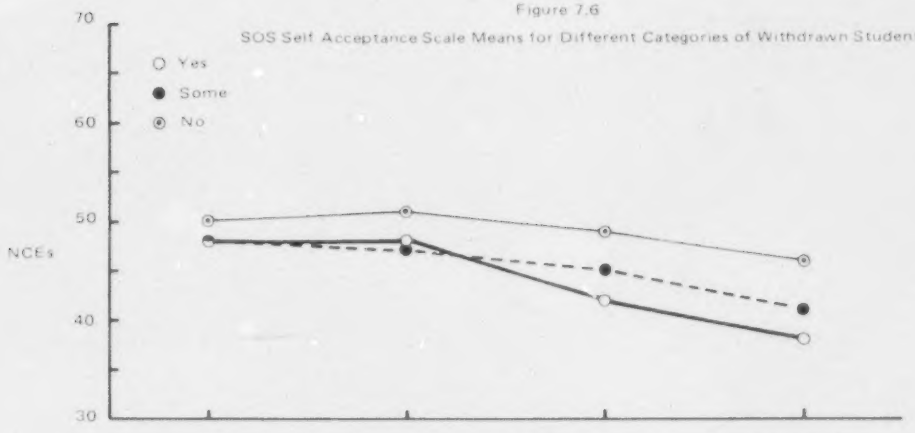
Self concept and classroom behavior are very much interrelated. At this time, however, it is pure speculation whether self concept causes inappropriate behavior or vice versa. One thing, however, is very clear:

> By developing the child's self-concept, schools have a seldom-recognized opportunity to provide an asset that will truly serve throughout life. We are only now beginning to glimpse the magnitude of the role self-concept plays in child develop-

ment. It is important to reexamine the practices and innovations of education, not only in light of how they affect academic development but also in the way they contribute to the development of a positive concept of self.[7,8]

Figure 7.6

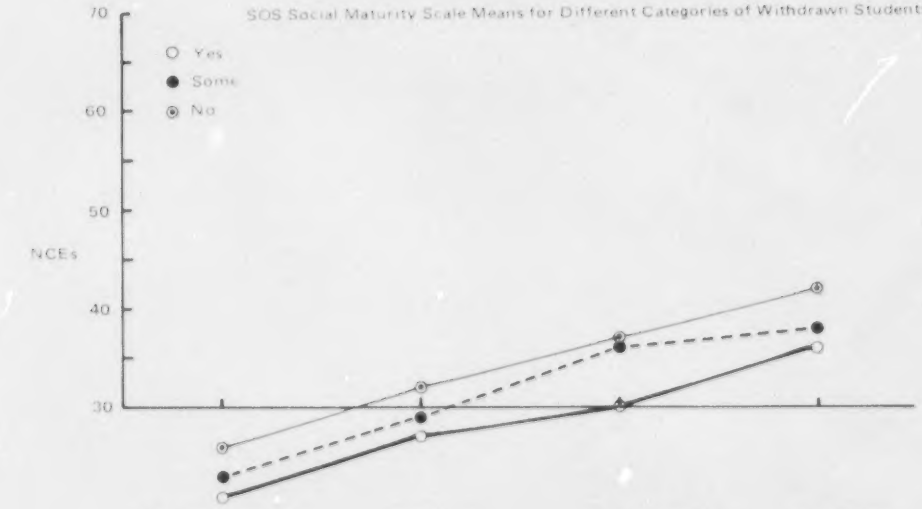
SOS Self Acceptance Scale Means for Different Categories of Withdrawn Students



	Kindergarten			First Grade			Second Grade			Third Grade		
	Yes	Some	No	Yes	Some	No	Yes	Some	No	Yes	Some	No
X	48	48	50	48	47	51	42	45	49	38	41	46
S.D.	13.8	16.6	15.7	16.4	16.6	16.8	19.3	17.7	17.6	17.7	19.0	18.6
N	36	104	825	225	354	2460	158	349	2362	130	304	2094

Figure 7.7

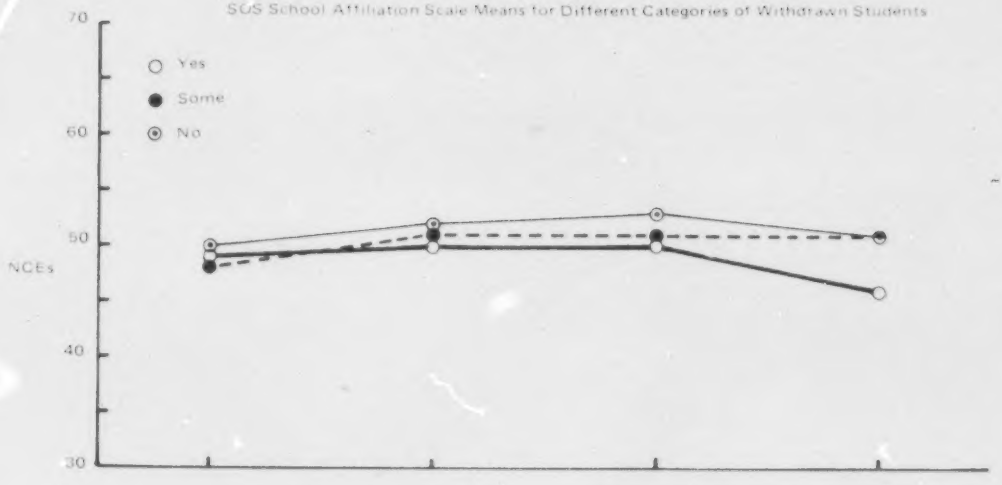
SOS Social Maturity Scale Means for Different Categories of Withdrawn Students



	Kindergarten			First Grade			Second Grade			Third Grade		
	Yes	Some	No	Yes	Some	No	Yes	Some	No	Yes	Some	No
X	21	23	26	27	29	32	30	36	37	36	38	42
S.D.	16.3	16.0	16.9	16.7	17.4	18.3	17.6	19.5	18.6	19.6	19.3	18.8
N	36	104	825	225	354	2460	158	349	2362	130	304	2094

Figure 7.8

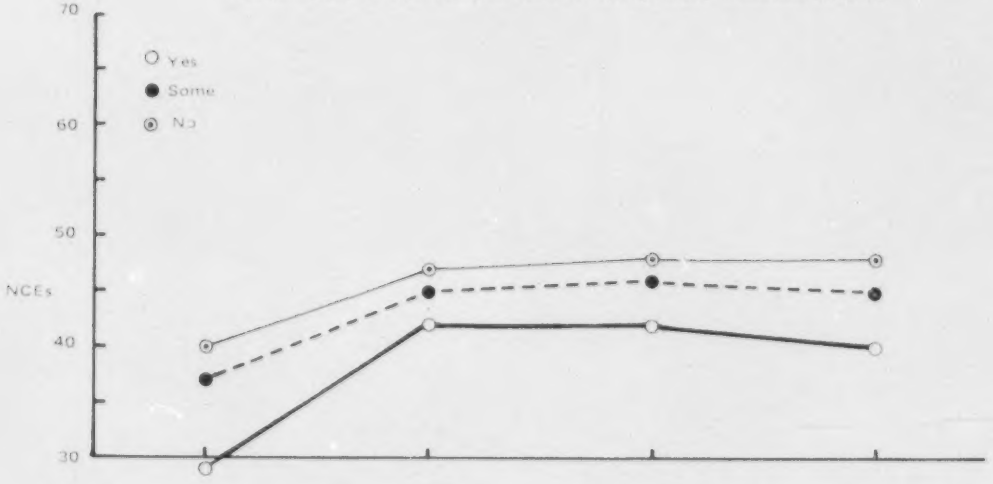
SOS School Affiliation Scale Means for Different Categories of Withdrawn Students



	Kindergarten			First Grade			Second Grade			Third Grade		
	Yes	Some	No	Yes	Some	No	Yes	Some	No	Yes	Some	No
$\bar{X}$	49	48	50	50	51	52	50	51	53	39	49	52
S.D.	15.6	17.0	16.3	16.8	17.2	18.1	19.0	20.0	19.4	21.7	20.6	20.5
N	36	104	825	225	354	2460	158	349	2362	130	304	2094

Figure 7.9

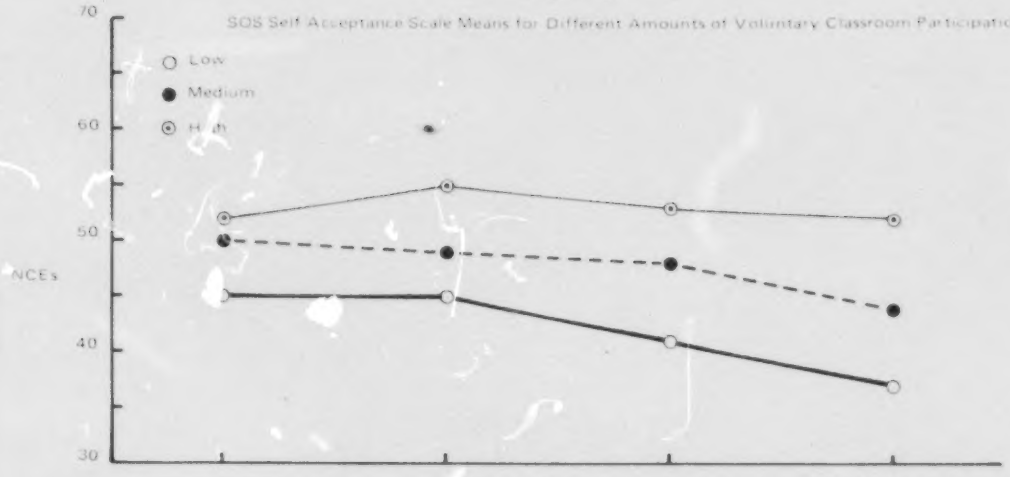
SOS Self Security Scale Means for Different Categories of Withdrawn Students



	Kindergarten			First Grade			Second Grade			Third Grade		
	Yes	Some	No	Yes	Some	No	Yes	Some	No	Yes	Some	No
$\bar{X}$	29	37	40	42	45	47	42	46	48	40	45	48
S.D.	18.4	20.3	19.6	18.7	17.0	17.7	17.0	16.8	16.8	16.5	16.6	17.9
N	36	104	825	225	354	2460	158	349	2362	130	304	2094

Figure 7.10

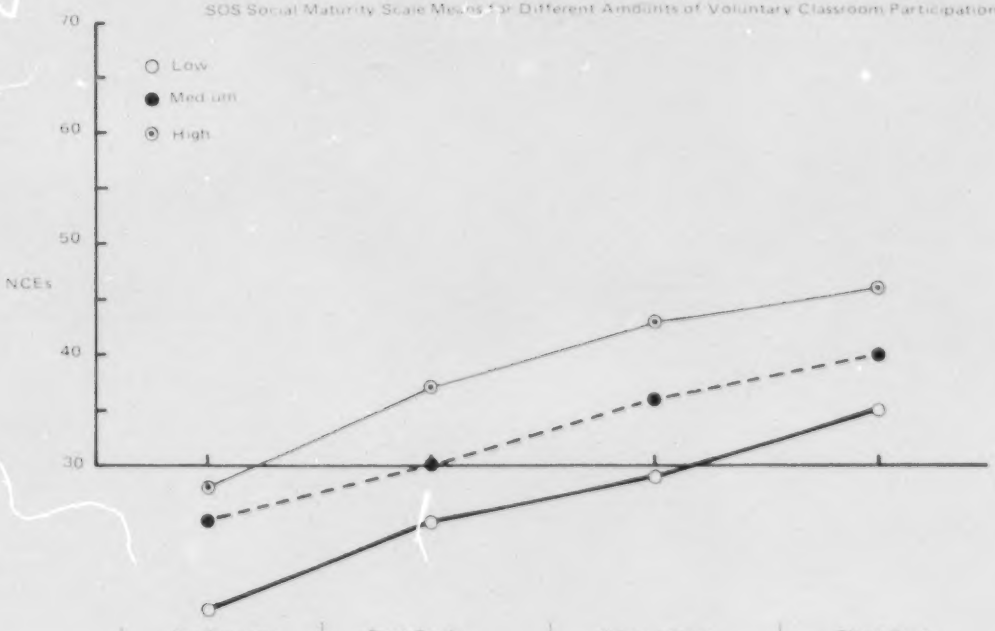
SOS Self Acceptance Scale Means for Different Amounts of Voluntary Classroom Participation



	Kindergarten			First Grade			Second Grade			Third Grade		
	Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High
X	45	50	52	45	49	55	41	48	53	37	44	52
S.D.	15.2	15.2	15.2	15.6	17.1	15.3	18.2	17.0	17.4	19.4	19.0	17.1
N	98	276	242	400	819	603	293	862	609	247	800	504

Figure 7.11

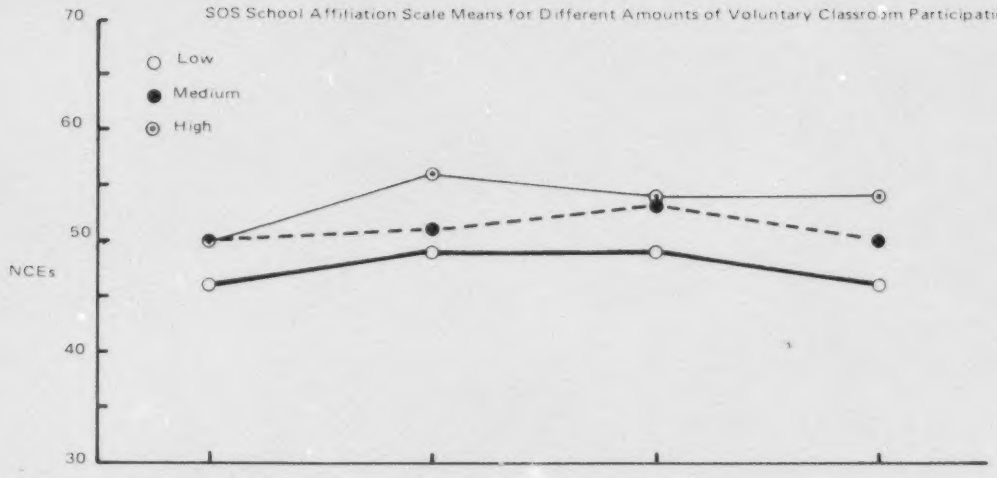
SOS Social Maturity Scale Means for Different Amounts of Voluntary Classroom Participation



	Kindergarten			First Grade			Second Grade			Third Grade		
	Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High
X	17	25	28	25	30	37	29	36	43	35	40	46
S.D.	15.2	16.0	16.8	16.5	17.4	19.6	17.8	18.1	18.1	20.3	18.0	19.0
N	98	276	242	400	819	603	293	862	609	247	800	504

Figure 7.12

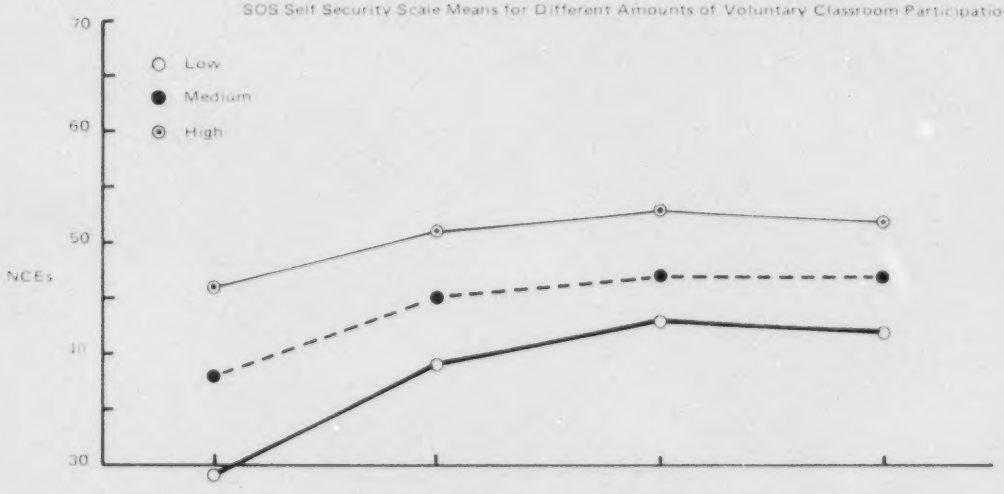
SOS School Affiliation Scale Means for Different Amounts of Voluntary Classroom Participation



	Kindergarten			First Grade			Second Grade			Third Grade		
	Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High
$\bar{X}$	46	50	50	49	51	56	49	53	54	46	50	54
S.D.	16.9	15.8	17.1	18.0	17.9	17.7	19.7	18.5	20.2	21.6	21.1	19.8
N	98	276	242	400	819	603	293	862	609	247	800	504

Figure 7.13

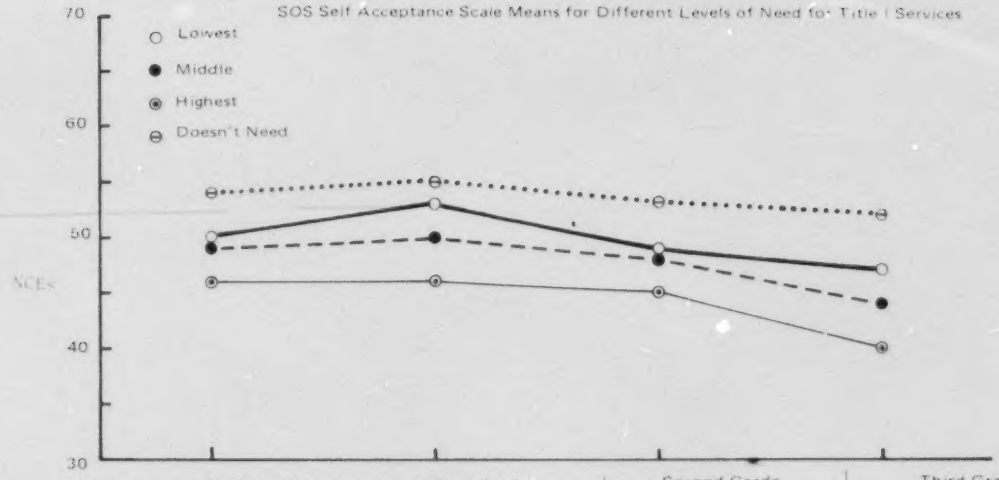
SOS Self Security Scale Means for Different Amounts of Voluntary Classroom Participation



	Kindergarten			First Grade			Second Grade			Third Grade		
	Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High
$\bar{X}$	29	38	46	39	45	51	43	47	53	42	47	52
S.D.	19.7	19.1	19.1	17.2	17.4	17.4	16.1	16.6	16.9	17.5	17.5	17.7
N	98	276	242	400	819	603	293	862	609	247	800	504

Figure 7.14

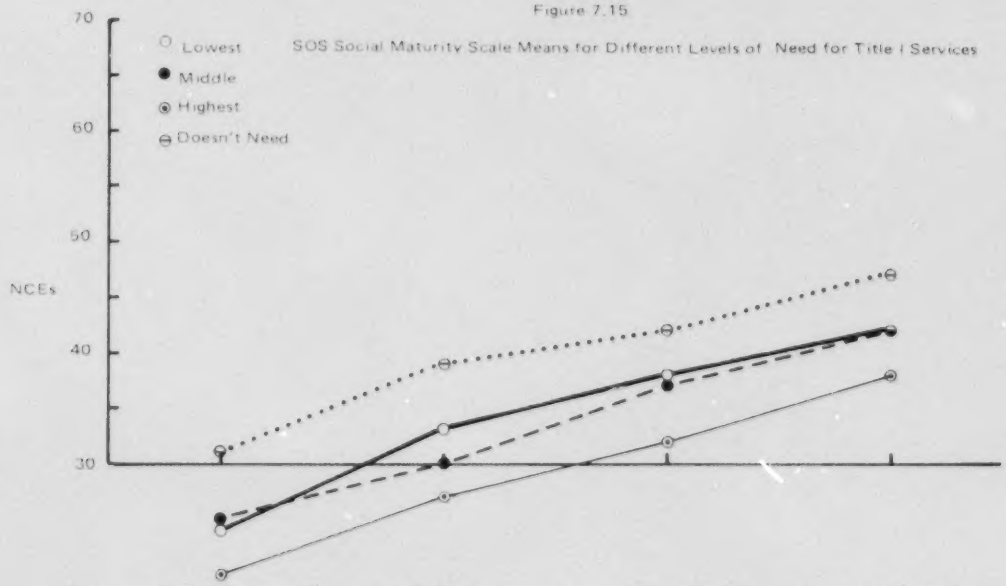
SOS Self Acceptance Scale Means for Different Levels of Need for Title I Services



	Kindergarten				First Grade				Second Grade				Third Grade			
	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High
$\bar{X}$	53.7	49.6	48.5	45.6	54.6	52.7	49.7	46.3	52.9	49.2	48.1	44.6	51.5	46.9	44.4	40.3
S.D.	15.6	16.5	15.4	15.0	17.2	15.8	16.5	16.2	17.2	17.0	17.2	18.1	17.4	18.5	18.6	18.7
N	252	170	310	232	594	532	841	1068	561	491	822	980	446	497	763	857

Figure 7.15

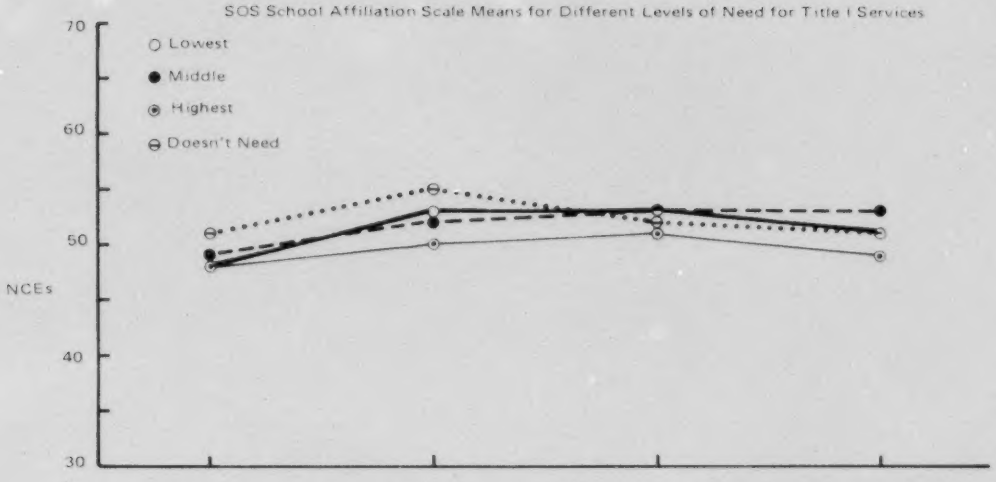
SOS Social Maturity Scale Means for Different Levels of Need for Title I Services



	Kindergarten				First Grade				Second Grade				Third Grade			
	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High
$\bar{X}$	31.3	24.1	24.7	19.5	39.0	33.0	30.3	27.1	42.0	38.1	36.5	32.3	47.3	42.1	41.8	37.8
S.D.	17.7	15.5	16.2	15.2	18.8	17.7	17.7	16.7	18.6	18.6	18.6	18.0	18.8	18.4	18.2	19.3
N	252	170	310	232	594	532	841	1068	561	491	822	980	446	497	763	857

Figure 7.16

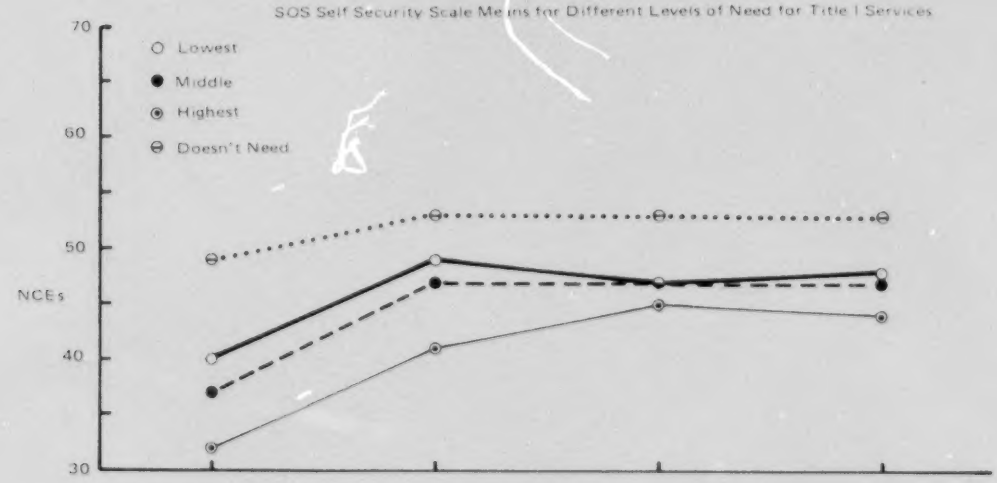
SOS School Affiliation Scale Means for Different Levels of Need for Title I Services



	Kindergarten				First Grade				Second Grade				Third Grade			
	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High
$\bar{X}$	51.3	48.3	49.3	47.7	55.0	52.7	51.8	50.2	52.5	52.8	53.1	51.3	50.8	50.8	52.6	49.4
S.D.	17.1	16.4	16.0	15.9	18.6	17.2	18.1	17.6	20.2	19.0	19.4	19.2	21.8	20.7	19.0	21.1
N	252	170	310	232	594	532	841	1068	561	491	822	980	446	497	763	857

Figure 7.17

SOS Self Security Scale Means for Different Levels of Need for Title I Services



	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High	Doesn't Need	Low	Med.	High
$\bar{X}$	48.9	40.5	36.6	32.1	53.0	48.9	46.6	41.2	53.3	47.2	47.2	44.6	52.9	48.3	46.9	43.9
S.D.	19.6	17.9	18.2	18.7	17.2	16.5	17.1	17.5	17.2	17.0	16.8	16.2	17.5	17.4	17.3	17.8
N	252	170	310	232	594	532	841	1068	561	491	822	980	446	497	763	857

SELF CONCEPT AND ACHIEVEMENT

The relationship between self concept and academic achievement is well documented. Students with high achievement scores evidence positive self concepts, whereas students with low achievement scores evidence negative self concepts. What is not known is the nature of the causal relationship between these two constructs. At least four possibilities may be entertained regarding the direction of causal influence:

- Achievement causes self concept.
- Self concept causes achievement.
- A reciprocal relationship exists with each construct exerting the same level of causal influences on the other.
- The observed relationship between the two constructs is caused by some third construct.

With the longitudinal data which will be available next year, a partial answer to the causality question may be formulated in this report. However, we must be satisfied with examining the relationship between self concept and achievement devoid of any causal implications.

Table 7.2 gives the canonical correlations between achievement subtests and SOS scales for grades K, 1, 2, 3, and 7. All correlations are highly significant. However, they are somewhat lower than those observed in studies with less homogeneous populations. Several studies reported by Stenner and Katzenmeyer (1977) show canonical correlations for achievement and SOS in the range of 0.45 to 0.55.

Table 7.2

Canonical Correlations Between CTBS/S Achievement Scores and Self Observation Scales Scores

Grade	K	1	2	3	7
Sample Size	895	2306	2138	1944	458
Canonical Correlation	0.45	0.39	0.34	0.36	0.41
Significance	0.001	0.001	0.001	0.001	0.001

Of particular interest are the respective achievement subtests and SOS scales which contribute to the canonical correlations. At the kindergarten level Visual Discrimination and language are highly related to Self Security and Self Acceptance. At the first grade level, Total Language and Mathematics Computation are highly related to Social Maturity, Self Acceptance, and Self Security. At the second grade level Vocabulary, Total Mathematics, and Language Mechanics are highly related to Social Maturity and Self Acceptance. At the third grade level, Language and Mathematics Computation are highly related to Social Maturity and Self Acceptance. Finally, at the seventh grade level, Total Reading and Total Language are related to Self Acceptance, Social Confidence, and Self Assertion.

Interestingly, among kindergarten students, Self Security has the highest relationship with achievement. Low achieving kindergarten students evidence high anxiety or low Self Security

scores, whereas high achieving kindergarten students have high Self Security scores. By the second grade, Self Security is only incidentally related to achievement, and Social Maturity acquires prominence. Self Acceptance is highly related to achievement at all five grade levels. On the achievement side it is particularly noteworthy that the various language subtests play such an important role.

Another way of grasping the important relationship between self concept and achievement is to contrast self concept profiles of high achievers (NCE > 60) and low achievers (NCE < 40). Figures 7.18, 7.19, 7.20, and 7.21 present the two profiles for kindergarten, first, second, and third grade students. The largest difference between high and low achievers at the kindergarten level is the eighteen point difference on Self Security. The differences on Self Acceptance and Social Maturity are ten and twelve points, respectively. Among first graders there is a seventeen point difference on Social Maturity, and a ten point difference on both Self Acceptance and Self Security. High achievers at the second grade level are more than ten points higher than low achievers on all scales except School Affiliation. At the third grade level, differences are substantial on Self Acceptance, Social Maturity, and Self Security, and moderate on School Affiliation. Overall, the figures depict the high emotional price paid by low achievers. Repeated failure in school taxes the emotional well-being of children at a level completely out of proportion to the academic benefits, if any, which accrue. These findings paint a bleak picture of frustration, self doubt, and anxiety, the perpetual companions of academic failure. If it can be shown that academic failure, in addition to being the companion of negative self concept, is a cause, then a difficult question must be asked: Is the pressure cooker atmosphere characterizing American primary grade education exacting too high a price; and, if so, what are the alternatives?

Figure 7.18

SOS Profiles for High and Low Achievers in Kindergarten

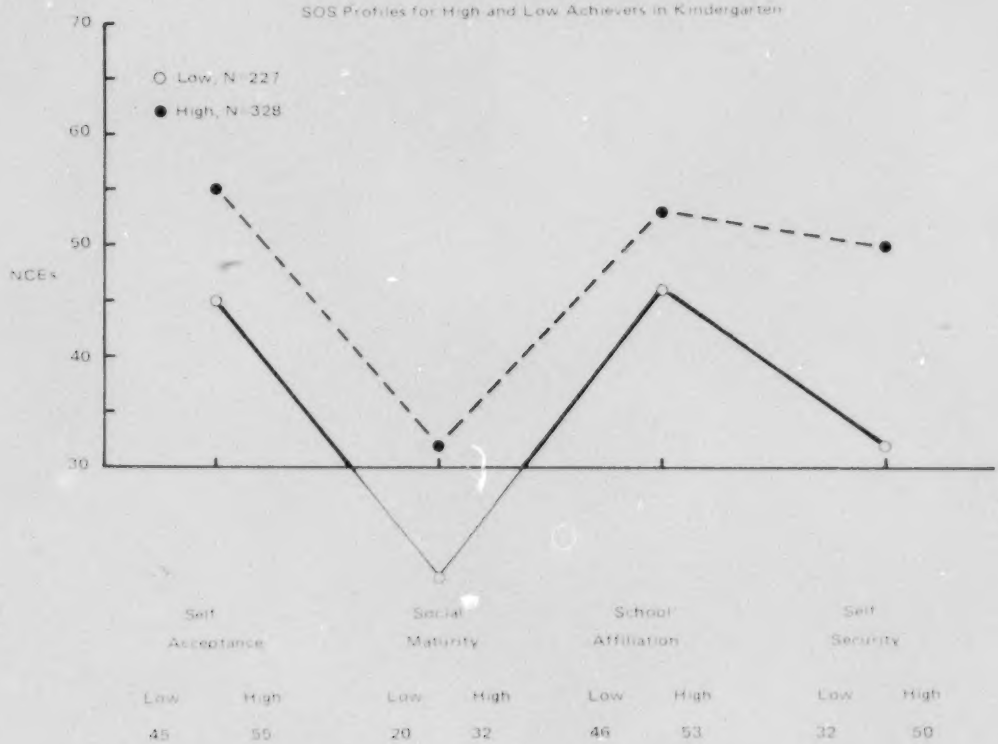
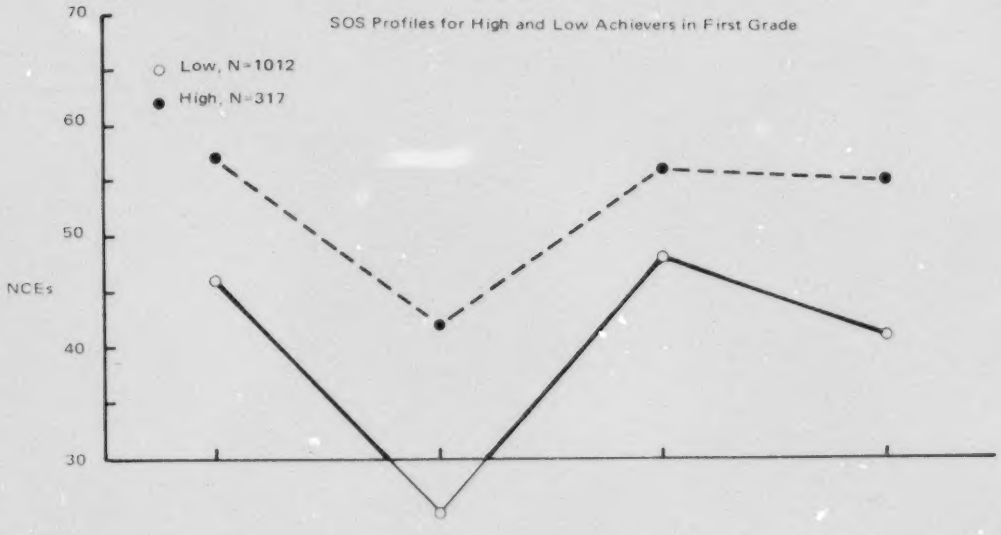


Figure 7.19

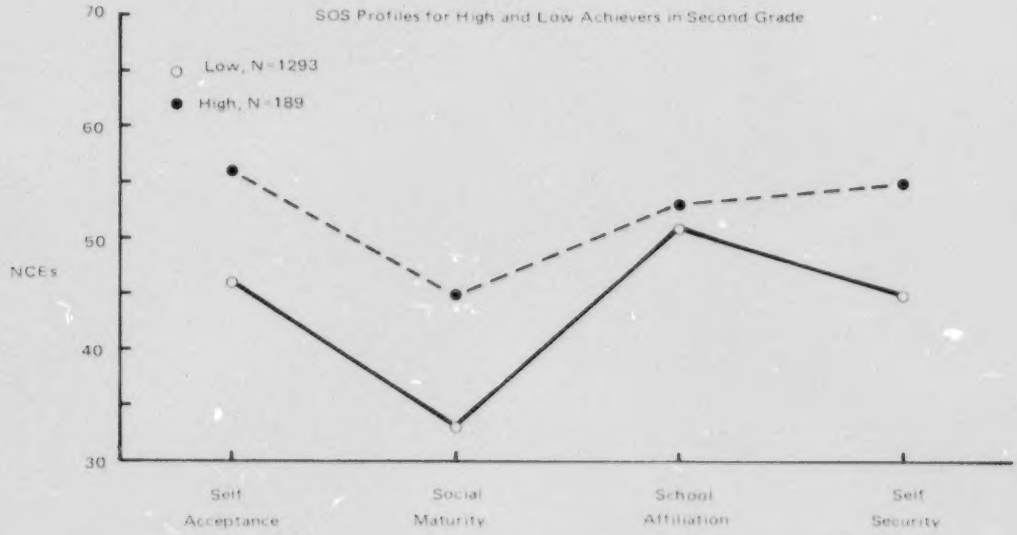
SOS Profiles for High and Low Achievers in First Grade



Self Acceptance		Social Maturity		School Affiliation		Self Security	
Low	High	Low	High	Low	High	Low	High
46	57	25	42	48	56	41	55

Figure 7.20

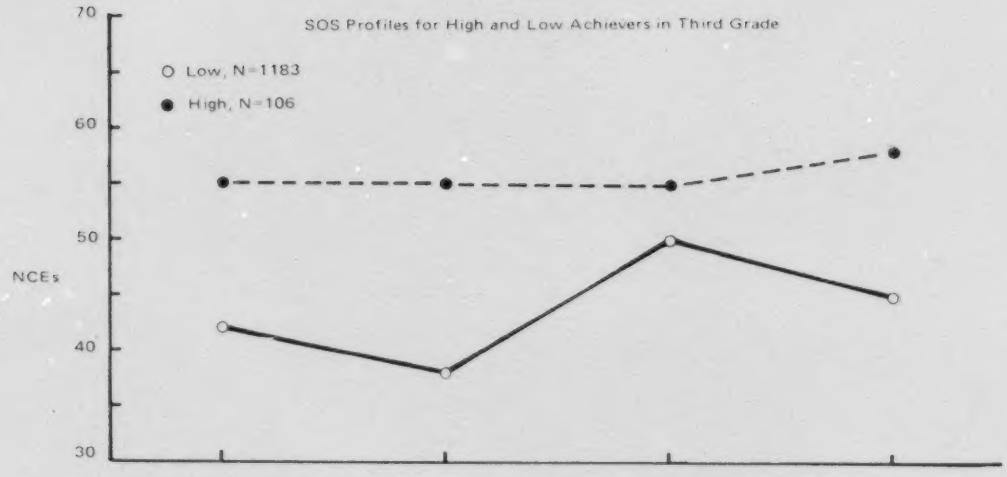
SOS Profiles for High and Low Achievers in Second Grade



Self Acceptance		Social Maturity		School Affiliation		Self Security	
Low	High	Low	High	Low	High	Low	High
46	56	33	45	51	53	45	55

Figure 7.21

SOS Profiles for High and Low Achievers in Third Grade



Self Acceptance		Social Maturity		School Affiliation		Self Security	
Low	High	Low	High	Low	High	Low	High
42	55	38	55	50	55	45	58

FOOTNOTES

7.1 W. W. Purkey, *Self-Concept and School Achievement*, (Englewood Cliffs, N.J.: Prentice-Hall, 1970).

7.2 A. W. Combs, and D. Snygg, *Individual Behavior* (Rev. ed.), (New York: Harper and Row, 1959).

7.3 C. R. Rogers, "Perceptual Reorganization in Client-Centered Therapy," *Perception: An Approach to Personality*, eds. R. R. Blake and G. V. Ramsey, (New York: Ronald Press, 1951).

7.4 A. Jackson Stenner and William Katzenmeyer, "Self-Concept Development in Young Children: Preliminary Findings of a National Study," *Phi Delta Kappan*, LVIII (December, 1976), p. 356.

7.5 A. Jackson Stenner and William Katzenmeyer, "Self-Concept Development in Young Children: Preliminary Findings of a National Study," (Durham, N.C.: in press), pp. 2-3.

7.6 Stenner and Katzenmeyer, in press, pp. 2-3.

7.7 Stenner and Katzenmeyer, in press, pp. 2-3.

7.8 Stenner and Katzenmeyer, *Phi Delta Kappan*, p. 357.

CHAPTER VIII. PSYCHOMOTOR DEVELOPMENT

Measurement of psychomotor behavior is not new. Historically, measuring physical ability extends back beyond the work of Alfred Binet on intelligence testing. For various reasons, however, measurement in the cognitive domain has received far more attention than measurement in the psychomotor domain.

Physical fitness testing in the schools dates back for well over 100 years. Originally, the primary aim of physical education itself was physical fitness. Most leaders in the field were students of medicine who believed in the preventative value of proper physical activity. Accordingly, the first physical fitness tests were *anthropometric*. They were based on body symmetry and the development of musculature. Eventually, the issues of cardiovascular efficiency and muscular strength were also addressed.

The concept of *organismic totality* began to modify the anthropometric approach until finally, after World War I, physical education and physical fitness came to be viewed as a significant contributor in such areas as social efficiency, recreation, and cultural appreciation. Organismic totality refers to the concept of *man as a whole*, rather than a being composed of separate cognitive, physical, and affective components. Philosophers such as Locke and Rousseau, echoing the beliefs of fifth century B.C. Athenians, advocated the concept of *wholeness* in viewing an individual. The current holistic approaches to education reflect the influence of these various thinkers.

Reflecting somewhat more the anthropometric approach, it appears likely that compensatory education has emphasized cognitive development almost to the exclusion of psychomotor development. This may be due to the fact that the deficiencies of socioeconomically disadvantaged children in reading and mathematics have been repeatedly documented through large scale testing programs employing nationally normed and widely accepted instrumentation. The psychomotor domain needs of children, in contrast, are not well documented.

In light of recent research, the tragedy of ignoring psychomotor development in educating not only disadvantaged children, but all children, is becoming increasingly obvious. Poor psychomotor performance has been found by some researchers to be related to cognitive development. It appears increasingly likely that some of these relationships are causal in nature, suggesting that one strategy for improving the academic performance of young children is to improve their fine and gross motor development.

Numerous investigations into relationships between the motor, psychomotor, and perceptual-motor domains and the intellectual or academic achievement domains have yielded various and often conflicting results. Singer (1968), and Singer and Brunk (1967) find some positive and statistically significant relationships between the intellectual and perceptual-motor domains.

Dibner and Karn (1969), investigating the relationship of the *Bender Gestalt Test* (BGT) to academic performance, found that predictions derived from the BGT vary with grade level:

- BGT predictions and teacher ratings are virtually equivalent in kindergarten.
- Teacher ratings slightly surpass BGT predictions in first grade.
- BGT predictions are inadequate indicators in second grade.
- BGT predictions enjoy moderate success in third and fourth grades.

Ismail and Gruber (1975) found that items from the motor domain could be used to predict academic achievement successfully within a multiple correlation framework. The best predictors

were coordination items, followed by balance items. In factor analytic studies, Chissom (1970) found that coordination and balance items consistently predicted academic achievement and other intellectual variables. Thomas and Chissom (1972) found a relationship between the perceptual-motor ability and the academic achievement of children in grades K-3; this relationship, however, tends to decrease as age increases.

Five years of research by IBEX, Inc., has demonstrated the tremendous negative effects that poverty exercises on child growth and development. Evidence suggests that gross and fine motor development may be much more sensitive to biological and environmental insult than either cognitive or affective development; therefore, psychomotor measures may have potential for diagnosing biological insult before long-term structural or biochemical effects appear.

Willis and Pishkin (1974) found that lower class children perform more poorly than middle class children on fine motor perceptual tasks. The possibility must be considered that a somewhat significant perceptual-motor development gap exists between low and moderate to high SES groups. Possible causes might be central nervous system deficit or a lack of actual perceptual-motor experience. Willis and Pishkin further feel that perceptual-motor problems may be related to poor pre and postnatal nutrition which may affect the central nervous system. Gross as well as fine motor performance can be negatively influenced by this same pattern of deprivation.

Caputo and Mandell's (1970) review of literature showed that two important areas affecting a child's motor ability and performance are the child's SES and the developmental history of both the child and his/her family. Generally, it seems that SES assumes a major role in determining the child's overall developmental prognosis. Troy et al. (1976), found differences for both sexes favoring high SES children in grades 2, 3, 5, and 6 on eleven of fifteen psychomotor factors. Similarly, Crable et al. (1976) demonstrated that gross motor ability is most highly correlated with SES and the general health domain; whereas, fine motor ability is related to "school related health."

The design for *Physical Fitness Survey* (PFS) pilot study involves a random sampling of ten Title I and ten non-Title I students from randomly selected schools. Only first, second, and third grade students were selected in the sample. These same students were used in the Piagetian assessment study. The sample characteristics are described in Table 4.3.

The children were tested individually by trained personnel. All the testing was done on the school premises, outside on the playground, and inside in a multipurpose room. The testing procedures were standardized by assigning examiner's stations in order to ensure that the test items were administered by the same person at any given school.

The PFS measures seven factors of gross motor performance and four factors of fine motor performance. In the first group of gross motor items, the student combines the power of more than one muscle group for the execution of a task which is then evaluated in terms of time and distance for both of these elements. Included in this section are the factors called Speed, Explosive Power, and Cardiovascular Endurance.

> Speed: This factor is measured by the *50-yard dash*. Students with low time (completed the task the most quickly) in this factor are generally able to maintain a maximum rate of speed over the required distance. Their rapidity of movement is usually characterized by a good balance of body weight, body density, muscular viscosity, length of legs, and flexibility. A high time score (prolonged length of time in accomplishing a task) by students on this factor indicates a general lack of speed, associated with poor muscular strength as opposed to poor endurance. This may be due to obesity, poor development of the large muscle groups in the legs, and limited or poor knee-joint flexibility.
>
> Explosive Power: This factor is measured by the *maximum vertical jump*.

Students with high maximum jumps exhibit the ability to mobilize their energy into a singular maximum contraction of large muscle groups while performing an aerobic task. Students with low scores often lack the combination of force (explosive movement of the leg muscles) and velocity (speed with which the body mass is projected through space) needed to attain a high maximum jump. Weight is a major factor in poor performance. If two students have the same height but different weights, and if all other influences are held constant, the student who weighs less should jump higher.

Cardiovascular Endurance: The *two minute squat thrusts* measure the cardiovascular endurance factor. Students with a high total score are able to persist in physical activity for extended periods of time. They are usually characterized by strong heart muscles, efficient circulation of blood through the tissues, properly functioning lungs, and high aerobic capacity. Students with low scores generally exhibit poor stamina, are subject to rapid muscular fatigue, and will enter into aerobic work more quickly than students possessing good cardiovascular endurance. Poor cardiovascular endurance may be associated with a wide variety of dysfunctions such as anemia, heart murmur, or asthma. Anatomical physiological problems may stem from poor muscular development in the arms and legs or from low cardiac output in proportion to the per-minute heart rate.

The second group of gross motor tests on the PFS is more of a reflection of the ability of the body to coordinate the activity of its muscles and joints than of the ability of the muscles to exert force and power. Factors included in this group are Flexibility and Agility.

Flexibility: This factor is measured by two items, the *bipolar flex* and *elbows to the floor*. A total flexibility factor is derived by summing the arm and leg measures of the first of these items and subtracting from that total the obtained score from the second item. A high total score indicates that the student has good overall flexibility, characterized by good extensibility of the arm and leg muscles, and good forward-then-downward movement of the lower back muscles. A low score might imply one of several potential flexibility problems: 1) the student might lack proper range of movement about the hip or shoulder girdle joints, 2) muscle extensibility might be limited by poor development or overdevelopment, or 3) a lower back disorder might exist, particularly if the elbows to the floor item significantly lowers the total flexibility score.

Agility: The agility factor measures the ability of the individual to move from one position in space to another employing the large muscle groups of the body. The *15-yard hop* measures the agility factor. Students with low time scores on this item are able to move the arms and legs rapidly and exhibit a good degree of coordination among the large muscle groups of the body. Low time scores are an accurate indicator of good running agility requiring a minimum of skill involvement. Students with high scores are unable to coordinate the hopping task with the forward movement of the body; their problem becomes one of being unable to maintain the direction, accuracy, and rapidity needed to accomplish the task.

The last two gross motor domain items on the PFS test are the amount of force which can be exerted for a short duration against a fixed object (Static Strength) and the amount of force which can be exerted by a set of muscle groups for a period of time when limbs are in motion (Dynamic Strength).

Dynamic (arm) Strength: The *tricep extension* is the item used to measure the dynamic arm strength factor. Students with high scores in this factor can repeat the item many times over. High scores reflect strong development of the biceps

and rotator cuff muscles. Students with low scores often lack muscular strength or cannot move their weight in proportion to the amount of force generated by the muscular contractions in the arms. Muscular arm strength is related to the cross-sectional size of a muscle group; therefore, a relationship exists between body weight and the number of repetitions that can be accomplished.

Static (arm) Strength: This factor is measured by the *flexed arm hang*. Students who are able to hang for a long period of time exhibit strong isometric strength and are able to support their body weights with the muscle groups of the arms. Students performing poorly on this item (a low time score) are unable to generate the force required to maintain the body in the hanging position. Low scores may be due to obesity, poor development of the arm muscle group, or both of these elements.

The final set of items on the PFS measures four aspects of Fine Motor Performance: hand-eye coordination, finger agility, digital coordination, and dominant and nondominant hand control. These measures complete the total evaluation of each student's physical development and, in conjunction with height and weight recordings, address both the static and dynamic aspects of physical fitness.

Hand-Eye Coordination: This factor is measured by the *bead string*. Hand-eye coordination involves speed and precision of hand movements governed by the eye. Students with low scores have good hand-eye coordination; movement is fast, precise, and is characterized by good finger dexterity. A high score by the students indicates poor hand movement and poor precision. Problems might result from vision deficiency, perceptual difficulties, and poor manipulative ability in the small muscles of the thumb and index fingers.

Finger Agility: This factor is measured by *drawing intersecting lines*. The task measures the degree to which a student can move his/her pencil in a rapid, multi-directional activity. Students with high scores have good agility in the hands and are able to coordinate and complete a writing task with fast hand movement. Low scores indicate the student's inability to coordinate an interpretative process (drawing x's) with hand movement. Low scores generally reflect problems with the mechanics of performing the task as opposed to the interpretative process.

Digital Coordination: This factor was measured by the *knotting rope* item and is characterized by skillful, controlled finger movement. Students with low time scores on this item generally exhibit high speed in hand and finger coordination and movement. A high time score indicates that the student lacks the ability to quickly manipulate objects. A low performance level on this item may be linked to inadequate neuromuscular coordination of the fingers and hands, poor interpretation of task assignment, or both of these problems. Muscular fatigue can also occur if the fine muscles of the hands or fingers are underdeveloped.

Dominant and Nondominant Hand Control: This factor is measured by the *marble dip*. Hand control involves speed, balance, and precision of the hand and wrist. Students with low times are able to transfer marbles quickly from one tray to another, thereby exhibiting well developed ability to use the hand for control and manipulation. High time scores indicate that the student may lack the ability to exhibit hand control in a systematic fashion. Low scores, for the use of the non-dominant hand, indicate that the student exhibits good control in a hand unaccustomed to performance of such a task.

A total of ninety-nine Title I and thirty-five non-Title I students are included in the results of this pilot study. The PFS scores for each student were standardized by sex within grade level before the

134 subjects were pooled for the analyses. Figure 8.1 shows the profile of mean scores expressed in NCEs on the PFS for Title I and non-Title I students.* The scale scores range from 31.8 to 56.7. The non-Title I students surpass their Title I peers on nine of the twelve scales. The only statistically significant difference (confidence level=0.95) between the two groups occurs on the Finger Agility scale, on which the non-Title I students score 10.1 NCEs on the average higher than Title I students.

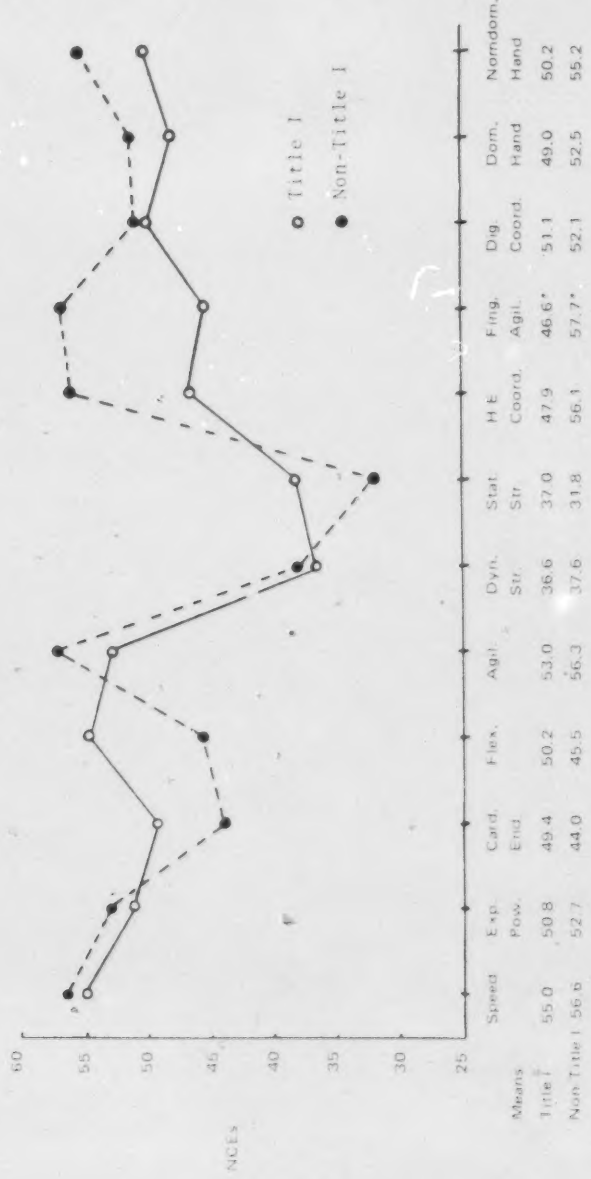


Figure 8.1 Differences Between Title I and Non-Title I Students on PFS Scales, Expressed in NCEs

Means	Speed	Exp. Pow.	Card. End.	Flex.	Agil.	Dyn. Str.	Stat Str.	H-E Coord.	Fing. Agil.	Dig. Coord.	Dom. Hand	Nondom. Hand
Title I	55.0	50.8	49.4	50.2	53.0	36.6	37.0	47.9	46.6*	51.1	49.0	50.2
Non-Title I	56.6	52.7	44.0	45.5	56.3	37.6	31.8	56.1	57.7*	52.1	52.5	55.2

*Differences significant at a 0.05 level of confidence.

*For purposes of simplicity, all PFS scales with low item scores which represent excellence on the tasks involved in the items have been recoded. The effect of this recoding is that as the NCE score *increases*, the student is always assessed as *achieving more*.

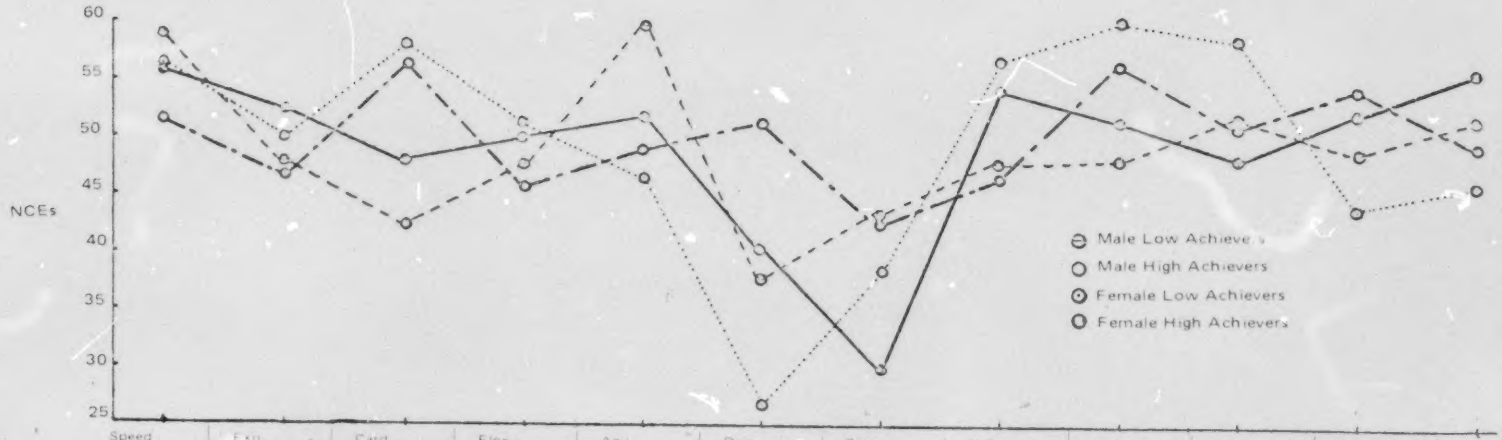
When the PFS sample is divided by sex category and level of achievement on the CTBS/S, some interesting differences become apparent. Males and females do not display high scores on the same scales. Neither do low nor high achievers reflect the same score tendencies for a given scale. On some scales, female low achievers score higher than female high achievers, while male high achievers score higher than male low achievers. To summarize, large differences in scores between male and female, high and low achievers exist on the following scales in the indicated directions:

- Cardiovascular Endurance: Female low achievers better than high achievers.
- Agility: Male low achievers better than high achievers.
- Dynamic Strength: Male and female, high achievers better than low achievers.
- Static Strength: Female low achievers better than high achievers.
- Finger Agility: Male high achievers better than low achievers, female low achievers better than high achievers.
- Digital Coordination: Female low achievers better than high achievers.
- Dominant Hand Control: Female high achievers better than low achievers.
- Nondominant Hand Control: Female high achievers better than low achievers.

It seems that there are more significant differences between female high and low achievers than between their male counterparts. On the Fine Motor Scale, the female low achievers perform better on the finger-related tasks, while the female high achievers have higher scores on the hand coordination tasks. Additionally, the low achievers of both sexes seem to do better in general than the high achievers on the gross motor items. The only outstanding apparent deficits seem to be for females on Dynamic Strength (low achievers) and Static Strength (high achievers). Perhaps in both of these areas, as defined in the scale item descriptions earlier in this chapter, improvement could be enhanced by a structured physical education program.

Figure 8.2

PFS Profiles for High Achievers and Low Achievers by Sex



	Speed		Exp. Pow.		Card. End.		Flex.		Agil.		Dyn. Str.		Stat. Str.		H E Coord.		Fing. Agil.		Dig. Coord.		Dom. Hand		Nondom. Hand	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
MALES $\bar{X}$	58.7	51.7	48.0	46.4	42.6	57.1	47.7	46.0	59.4	48.8	37.9	50.7	43.0	42.3	48.2	46.7	47.7	55.7	51.3	50.2	48.5	54.0	51.0	49.3
S.D.	22.3	20.1	13.1	23.8	26.9	16.0	27.0	25.5	26.1	11.4	20.4	30.5	28.0	28.3	22.7	21.6	23.21	17.5	23.4	17.9	20.0	30.4	20.0	17.9
N	43	19	43	19	43	19	43	19	43	19	43	19	43	19	43	19	43	19	43	19	43	19	43	19
FEMALES $\bar{X}$	56.3	56.1	50.1	53.2	57.9	47.7	51.1	50.8	47.0	51.7	27.1	40.0	38.4	29.7	56.3	54.2	59.1	50.5	58.2	48.3	43.5	51.7	48.8	56.0
S.D.	16.9	22.2	19.0	22.1	17.6	23.3	29.4	21.8	17.8	23.2	26.9	30.6	33.1	28.9	26.2	22.0	17.2	19.4	15.3	15.1	17.2	24.6	18.5	23.5
N	20	38	20	38	20	38	20	38	20	38	20	38	20	38	20	38	20	38	20	38	20	38	20	38

CHAPTER IX. PIAGETIAN CONSERVATION ASSESSMENT

In investigating the effects of one variable upon the behavior of another, it is often enlightening to view the interaction of these variables from the frame of reference provided by a theory. In the D.C. Title I evaluation, one focal point of interest is the nature of the relationship between conservation ability and achievement (both mathematics and reading). From the results of this aspect of the evaluation, some indication will be derived of possible programmatic modifications which will help to serve the needs of Title I students more effectively. Also important is the association of conservation ability and a number of variables representative of the other domains (psychomotor, self concept, student background) reviewed in this project. This chapter not only presents the results of these investigations but also a brief discussion of the cognitive theory proposed by Jean Piaget.

The Cognitive Theory of Jean Piaget

Piaget recognizes four developmental stages of the intellect which are common to children. These stages have approximate initial and terminal points in terms of age, but not all children either reach each stage or emerge from it according to this approximated schedule. The stages, however, always do occur in the order indicated during the intellectual development of all children. The stages are:

- Sensorimotor.
- Preoperational.
- Concrete operations.
- Formal operations.

Table 9.1 gives typical abilities and approximate points of onset and terminus with respect to age for each of the four stages. During each phase the child encounters a world needing organization and, thus, applies his/her maturing ability to perceive and to educe general relations, which, in turn, are used to impose order on a previously unordered segment of the environment.

The D.C. Title I program focuses on the *preoperational* (grades K-1) and the *concrete operations* (grades 2-3) stages, although there was also a seventh grade component being evaluated this year. In view of this emphasis, we intend to restrict the remainder of this section to a treatment of the peroperational and concrete operations stages. From age two to about age four, the preconceptual phase of the preoperational stage predominates. Although rapid language development occurs at this time, manipulation of concepts is not yet possible. To a child at this age, all experiences are new; no generalization or analysis of similar events is made. A preconceptual child who is presented with the task of learning to read is bewildered both by variations in type faces and by upper and lower case forms of the same letter; he/she is subsequently unable to learn and apply rules, since an internal understanding of the rules of his/her environment is still being developed.

Gradually, though, the child enters the intuitive phase of preoperational thought (usually around age five). He/She mentally begins to undo changes in objects so that they revert to their original form. This facility of reversibility is particularly manifested during the concrete operations stage in

Table 9.1

Piaget's Stages of Cognitive Development*

	SPAN	CHARACTERISTIC ACTIVITIES
Sensorimotor	Birth-2 yrs.	• Intelligence is manifested in overt behavior. • Innate reflexes become more efficient. • Simple acts are repeated for their own sake. • Simple acts are repeated to produce interesting effects. • Learned responses are used to obtain a desired goal. • Active trial-and-error experimentation is initiated. • New means are invented through internal mental combinations.
Preoperational	2-7 yrs.	• Use of language is frequent. • Meanings of objects and events are manipulated and the child engages in *symbolic* behavior. • Viewpoint of another person is difficult to comprehend. • Words and images are not generally organized into solidly understood rules and concepts.
Concrete Operations	7-11 yrs.	• Series of actions can be represented mentally. • The ability to conserve develops and improves. • Relational terms are understandable. • The notions of a whole and its parts are comprehended. • Objects can be arranged along some quantified dimension on an ordinal scale, such as length or weight.
Formal Operations	11 yrs. +	• A number of possible explanations of, or solutions to, a given situation are generated. • A plan of attack towards a given problem is developed. • Thought patterns are self-consciously deductive. • Operations are organized into higher operations.

what are called *conservation abilities.* Conservation ability is a critical milestone in Piaget's theory which separates the preoperational and the concrete operations stages in cognitive development. This conservation skill is defined as the ability to understand that certain empirical properties or attributes such as weight, quantity, and volume remain constant, despite transformations such as alterations in shape or displacement. A conserving child will say that the amount of clay in a ball which he/she has watched being flattened into a pancake is unchanged, whereas a nonconserver will maintain that the pancake has more clay. The attainment of conservation abilities signifies readiness for reading, as well as for other academic skills.

Early research on the possibility of teaching conservation skills spawned little encouragement for educators wishing to hasten the acquisition of such abilities. However, more recent investigations have indicated that there are certain variables which facilitate the development of conservation

*The source is L. Joseph Stone and Joseph Church, *Childhood and Adolescence: A Psychology of the Growing Person,* Second Edition (New York: Random House, Inc., 1968).

abilities related to quantities in terms of number, length, area, substance, and weight. Age differences among the subjects in various studies are unrelated to success in acquiring the skills; all successful efforts, though, did involve training in *reversibility* at some point during the experiment.*

Despite the success of attempts to train children in conservation skills, some limitations remain. For example, although conservation skill for a given quality, such as length, is readily transferable to new situations, the acquisition of conservation skills applied to one quality does *not* generalize to another quality. A conservation skill for length does not necessarily apply to one for weight. In one study (Peters, 1969), a multiple regression approach was taken, using age, cognitive style, and language comprehension scores to predict number conservation scores; only 25 percent of the total variance was subsequently explained, indicating that our understanding of conservation acquisition is far from being thorough. Finally, even though such skills can be taught, it seems that *natural* conservers (children who acquire the skills without intervention) perform better on both the *Stanford Achievement Test* (SAT) and the *Otis-Lennon Intelligence Test* than trained conservers, who similarly perform better than nonconservers (Bearison, 1975).

It also seems that conservation abilities are influenced by sociocultural factors. It has been shown (Gaudia, 1974) that children with low SES backgrounds of White, Black, and American Indian ethnicity earn conservation scores which are two years below the test norm (in terms of age) for middle class children. Similarly, low SES children have taken nearly twice as many trials to acquire conservation skills in training compared to middle class children (Figurelli and Keller, 1972). Elsewhere, only half as many low SES as middle SES children in the second grade have succeeded on a brief conservation assessment test (Almy et al., 1966).

In conclusion, a child's understanding of conservation concepts is a reasonable indicator of the attainment of intuitive, preoperational thinking. Conserving children are likely to possess the conceptual faculties prerequisite to success in reading and mathematics in the early grades. Furthermore, although effects on conservation attainment related to SES do occur, a lasting understanding of conservation concepts *can* be taught.

CONSERVATION ABILITY IN TITLE I AND NON-TITLE I STUDENTS

Students possessing a thorough understanding of conservation concepts are also likely to exhibit intuitive preoperational thinking. They may be able to read and perform mathematical operations in their early elementary school years. Piaget's theory of cognitive development may, therefore, prove to be enlightening in viewing the Washington, D.C. Title I evaluation results.

The design for this conservation assessment study involved sampling randomly ten Title I and ten non-Title I students from each of sixty schools. Only first, second, and third grade students were included in the sample. An effort was made to include males and females equally. Each child was tested individually using the *Conservation Assessment Package* (CAP) developed for this study. The test measured five aspects of conservation ability: conservation of two-dimensional space, conservation of number, conservation of continuous quantity, conservation of substance, and conservation of weight. The sample characteristics are described in Table 9.2.

*Reversibility can be demonstrated by taking a rolled ball of clay, flattening it into a pancake, then rolling it up into a ball once more, making it the same size as it was initially.

Table 9.2

Sample Characteristics of the 761* Students Responding to the Conservation Assessment Package

	First Grade		Second Grade		Third Grade	
	Male	Female	Male	Female	Male	Female
Non-Title I	39	35	37	45	33	55
Title I	92	78	81	94	86	86
Total	131*	113	118	139	119	141

* Sample size represents those students who were matched with the Student Information Form.

The CAP presents the child with eight problem situations involving some transformation such as flattening one of two equal balls of clay. The test administrator then asks the child if the amount of clay has been changed in the flattening process. One point is awarded for the correct answer to each of the eight questions. Another point is awarded for a logical response to the question, "Why?" which always follows a correct response to the first question. Thus, a child's score ranges from 0 to 16. For purposes of several analyses, the scores were categorized into four groups: nonconservers, 0-4; low conservers, 5-10; good conservers, 11-14; high conservers, 15-16. Table 9.3 gives the percentage of students classified as good or high conservers.

Table 9.3

Percentage of Students in Each Grade by Sex and by Program Type Category Who are High or Good Conservers

	First Grade		Second Grade		Third Grade	
	Males	Females	Males	Females	Males	Females
Non-Title I	25.6	34.3	62.2	55.6	84.8	72.7
Title I	26.1	23.1	46.9	41.5	73.3	55.8

In general, there are more male conservers than female conservers. This pattern is opposite to the finding that Title I females outperform males on the achievement tests. As shown in Table 9.3, the percentage of conservers increases at each grade level, suggesting that many children attain conservation skills between the end of first grade and the end of second grade. However, approximately one third of Title I children are still not conserving at the end of third grade.

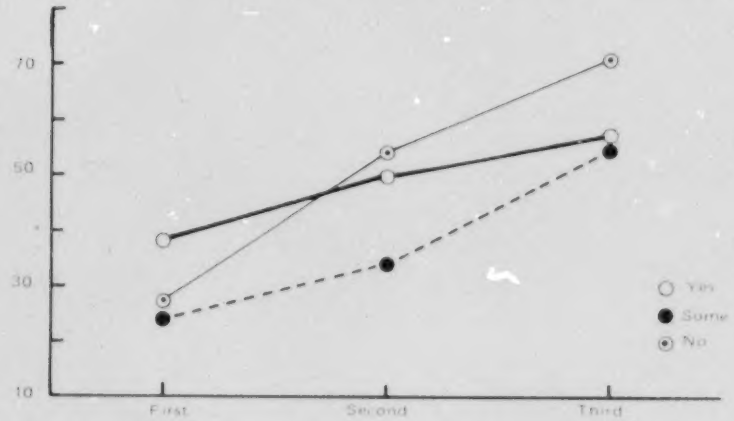
Similarly, non-Title I children are consistently more likely to be conservers than Title I children. The difference between the two groups increases as the children become older. This signifies that the Title I children not only start out behind their non-Title I peers in conservation abilities, but actually lose ground as time passes.

The reader will undoubtedly notice that percentages of "conserving students" (high or good conservers) always increase with grade level. Jean Piaget's theory is developmental in structure. It is, therefore, based upon stages which coincide with the passage of certain lengths of time. Hence, as a child matures, he/she is expected to be, accordingly, more and more capable of conserving. The results presented in all of the tables in this chapter strongly support this theoretical assumption.

Using the *Student Information Form* (SIF), classroom teachers in Title I schools rated their pupils on several characteristics (see Table 4.1 for a description of the items comprising the SIF). Figure 9.1 displays the percentages of high or good conservers in each grade level by teachers' ratings of their withdrawn tendencies, if such tendencies interfered with academic performance. As age increases, the students not characterized as being withdrawn become much more likely to be conservers than those who exhibit at least some withdrawn tendencies. In fact, almost half of the withdrawn students are not conserving by the end of third grade.

Figure 9.1

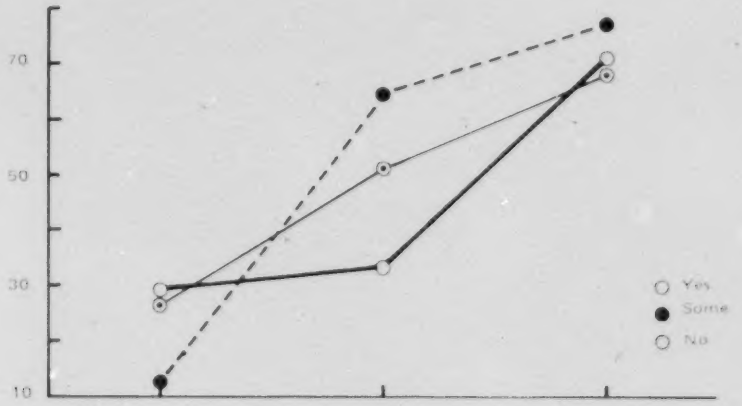
Percentage of High or Good Conservers by Withdrawn Categories and Grade Level



	First Grade	Second Grade	Third Grade
Yes	38.5	50.0	57.1
Some	14.3	34.2	55.0
No	27.2	54.4	70.7

Figure 9.2

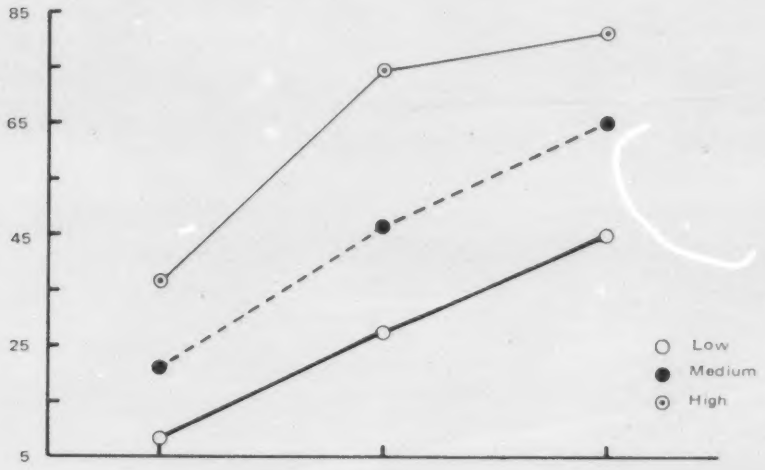
Percentage of High or Good Conservers by Aggressive Categories and Grade Level



	First Grade	Second Grade	Third Grade
Yes	29.0	33.3	71.4
Some	12.5	64.5	77.3
No	26.3	5.14	68.1

Figure 9.3

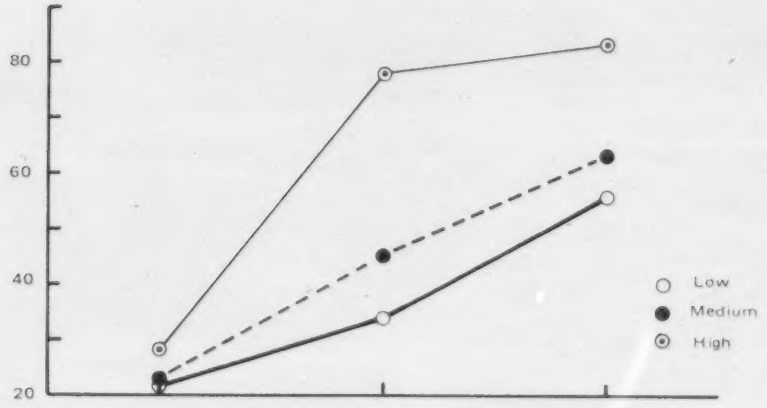
Percent of High or Good Conservers by Amount of Voluntary Classroom Participation and Grade Level



	First Grade	Second Grade	Third Grade
Low	8.7	27.6	45.0
Medium	21.2	46.8	65.2
High	36.7	74.3	81.2

Figure 9.4

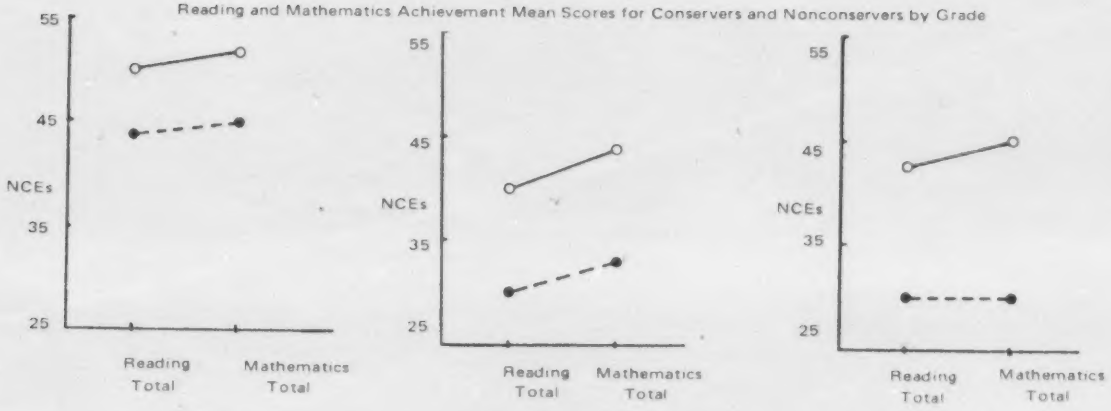
Percentage of High or Good Conservers with Background experience by Grade Level



	First Grade	Second Grade	Third Grade
Low	22	34	56
Medium	23	45	63
High	28	78	83

Figure 9.5

Reading and Mathematics Achievement Mean Scores for Conservers and Nonconservers by Grade



Number of: Conservers	55	Conservers	111	Conservers	167
Number of: Nonconservers	146	Nonconservers	108	Nonconservers	61

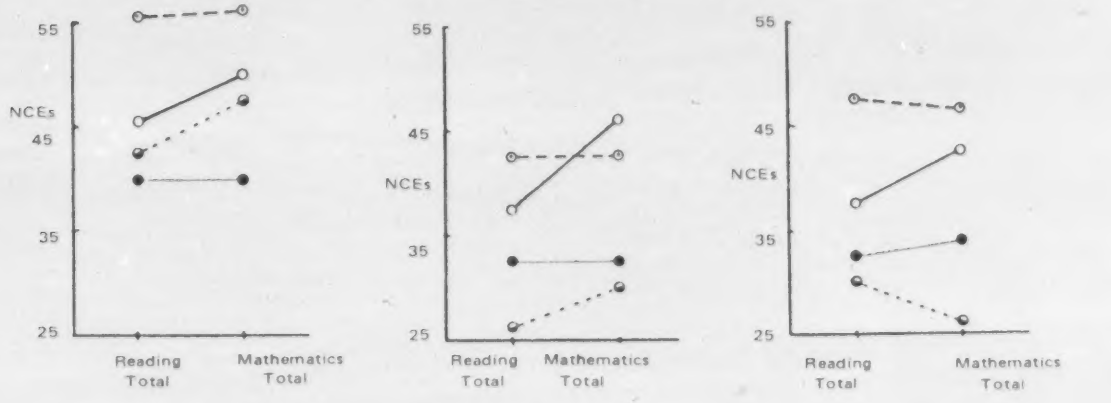
CONSERVERS

NONCONSERVERS

Attrition in sample sizes is due to data matching requirements for the achievement test and the CAP.

Figure 9.6

Reading and Mathematics Achievement Mean Scores for Conservers and Nonconservers by Grade and Sex



	Male	Female		Male	Female		Male	Female
Number of: Conservers	30	24	Conservers	53	53	Conservers	80	83
Number of: Nonconservers	78	68	Nonconservers	48	59	Nonconservers	24	36

MALE CONSERVERS

FEMALE CONSERVERS

MALE NONCONSERVERS

FEMALE NONCONSERVERS

Attrition in sample sizes is due to data matching requirements of the achievement tests and the CAP.

An interesting comparison involves the percentages of high or good conservers in each grade by teachers' ratings of their aggressiveness (see Figure 9.2). Again, students were rated as aggressive only if their behavior interfered with academic performance. Here, the students rated as being somewhat aggressive become much more likely with age to be conservers than either the aggressive students or those students who were characterized by their teachers as having no aggressive tendencies which presented an obstacle to their classroom performance. In fact, the aggressive students are slightly more likely to be conservers by the end of third grade than those whose data shows that they are nonaggressive.

There is an absolutely clear relationship between voluntary classroom participation and conservation abilities (see Figure 9.3). Conserving students are two to three times as likely as nonconservers to participate voluntarily in the classroom. By the end of third grade, fewer than half of the students who rarely participate voluntarily in the classroom are high or good conservers. Over four-fifths of those who participate voluntarily and frequently in the classroom are high or good conservers.

The background experiences of students are also related to their conservation abilities. Figure 9.4 shows a tendency similar to that displayed in Figure 9.3. Students with many background experiences facilitating successful classroom performance are nearly twice as likely as those with few such experiences to be conservers. In this instance, however, the low and medium experience groups are much more nearly equal to each other than either are to the high experience group.

The largest single contributor to conservation ability is age. Other than this, however, factors which seem to relate to this cognitive skill are voluntary classroom participation and background experiences leading to successful classroom performance. The intensity of withdrawn and aggressive tendencies also is related to conservation ability, though not quite as strongly as the two preceding factors.

When high and good conservers as one group are compared to low conservers or nonconservers as another group at the first grade level, several of the SIF variables show statistically significant differences between these two groups. Aggressive behavior; voluntary classroom participation; supportive family environment; number of years below grade level in both reading and mathematics; need for Title I services relative to other students; and background experience, which facilitates successful classroom performance, all display substantial differences which are statistically significant at a confidence level of 0.95 or better. None of the SIF variables reflect statistically significant differences at grade levels two or three.

The ability to conserve is also highly related to achievement in reading and mathematics performance. Figure 9.5 shows the dramatic differences on CTBS/S total reading and total mathematics scores expressed in NCEs for two groups of students: those with a CAP score between eleven and sixteen, labeled "conservers," and those with a CAP score less than eleven, labeled "nonconservers."* As the reader can see, score differences for both scales reflect approximately ten NCE points at a minimum and loom up to a maximum of nearly fifteen NCE points. Notice also that the differences between conservers and nonconservers subsist regardless of grade level. This illustration graphically underscores the substantial relationship which conservation ability enjoys with cognitive achievement in the areas of reading and mathematics.

Figure 9.6 further refines the description of conservation ability versus cognitive achievement by presenting grade and sex specific delineation. Notice that there are no substantial differences between the number of males and that of females conserving at each of the three grade levels. However, there does seem to be a sex difference in terms of the cognitive achievement scores for

*This classification is essentially a pairwise collapsing of the four previously defined categories: high conserver plus good conserver, and low conserver plus nonconserver.

conservers and nonconservers. At all three grade levels, females tend to earn higher scores on the reading and mathematics achievement scales than males, regardless of their ability or inability to conserve. The single "exception" occurs in second grade for the conserving group on the mathematics scale; here, the males have a higher score than the females. However, the difference is slightly more than one NCE point, which could be due to measurement error. The sex-based relationship *does* persist strongly across the other grades and for the reading scale. The reader can also see the same relationship discussed previously between conservers and nonconservers for the reading and mathematics scales at all three grade levels.

SUMMARY

By viewing the results of this chapter all together, several intriguing facts become clear. For example, at each grade level there are more males than females who are conservers; the only exception is the non-Title I group in first grade. However, the females still evidence higher reading and mathematics scores than do their male counterparts, conservers or nonconservers. The beginning of a profile for a conserving child is also depicted. The conserving child at the end of the third grade is not withdrawn but is somewhat aggressive. In addition, a large amount of background experience leading to successful classroom performance and frequent, voluntary classroom participation further characterizes the conserving student. This description of a conserving child does reinforce the western civilization notion of competition. The reader can also easily envision the reinforcement which such assertive, active participants receive from classroom teachers, thereby further increasing the likelihood of this behavior. All of these forces serve to encourage active application of conservation ability in the classroom.

The reading and mathematics scores consistently show differences of nearly half of a standard deviation, or 9 NCEs or greater, between conservers and nonconservers. In addition, the mathematics scores are higher than the reading scores, except for those of the conserving third graders. The results presented in Chapter 6 suggest a linkage between skills such as recognizing embedded figures and reading ability. Since mathematics, more than reading, relies on understanding symbols and relating them to their proper correlates, it is possible that the approach advocated for teaching reading skills in Chapter 6 approximates the currently implemented techniques for teaching mathematics skills. If the suggested approach were successful and it were already being applied in teaching mathematics skills, the necessary result would be higher scores in mathematics than in reading achievement. This is, in fact, the result depicted in Figure 9.5.

Finally, the percentages of conservers steadily increase across the three grade levels for both Title I and non-Title I students. However, more students classified as non-Title I are able to conserve at each grade level than those classified as Title I. By the end of the third grade, approximately one-quarter of non-Title I and one-third of Title I students still are not conserving. The large percentage of conserving students, however, indicates that moderate achievement scores in abilities such as reading and mathematics skills are possible. This is not the case for second and third grade, as is illustrated by Figure 9.5.

The results of this year's evaluation replicate those of last year. In the 1974-75 evaluation, males were also more likely than females to be conservers at each grade level, despite the females' higher achievement scores in reading and mathematics. The fact that conservers consistently exemplify higher achievement scores than nonconservers, at each grade level and for both reading and mathematics total scales, is likewise duplicated in the current year's results. In addition to these replicated findings, further breakdowns of the effects of conservation ability upon educationally relevant variables have been investigated this year. The recommendation for still further study in this area remains.

FOOTNOTES

9.1 Raymond B. Cattell, *Abilities: Their Structure, Growth, and Action,* (Boston: Houghton Mifflin Company, 1971), p. 98.

9.2 Cattell, p. 117.

CHAPTER X. INSTRUCTIONAL PROCESS ANALYSIS

Children in autumnal classrooms are taught about the icebergs—those silent ships of ice which sail the northern and southern latitudes of the oceans of the globe. The lesson stressed regarding this natural phenomenon is that the vast majority of an iceberg's mass remains hidden to the observer; sailors who ignore this basic fact often participate in unexpected swimming lessons. However badly drawn, this analogy seems appropriate to the Consortium's past and present experiences with the assessment of Title I classroom process components.

The evaluation of the instructional process parameters for the 1974-75 school year began in the spring of 1975. The assessment instrument was designed to establish baseline data regarding teachers, educational aides, and resource teachers. The instrument developed by the Consortium, in consultation with the Title I staff, was lengthy. Subsequently, the information gleaned was not as definitive as the evaluation team had hoped. It was administered in Title I schools to respondents who questioned its informational utility. The respondents proved to be accurate in their assessment. By virtue of being selected as evaluator (for the 1975-76 school year), the Consortium was granted a second opportunity to identify and delineate the Title I process domain.

The Information Based Evaluation (IBE) method of design is intrinsically a learning exercise for those participating in it. Accordingly, this year the Consortium traversed an iterative procedure composed of proposal submission, critique, and revision. Members of both the Consortium and the District of Columbia's school system actually canvassed the teachers and other faculty members of the D.C. schools. As a direct result of this intensive, interactive procedure, teams of staff from the Consortium and the school system made a brief presentation to each school. The 1975-76 instructional process battery is a refined instrument which yielded far more useful information than did its predecessor in 1974-75. The process instrument was delivered to the schools and submitted to the appropriate Title I staff members for their response within an extended time frame. This modification in procedure increased both the rates of return and completion.

It is the contention of IBEX and of Roy Littlejohn Associates that the cognitive and affective growth of Title I students can occur only in an environment which is stimulating. The focusing agents for the curriculum affecting the Title I student are the teacher and other classroom personnel. The Consortium would do a serious disservice to the Title I program if it did not elaborate upon its characteristics by identifying its size, direction, and structure. The following discussion attempts such a description.

General Profile of Title I Teachers and Educational Aides

The return rate for usable questionnaires this year was 761, compared to 620 for the previous year—an increase of about 22 percent. We ascribe this improved administration and collection procedure to greater respondent interest, as a result of the evaluation orientation. Nearly all Title I teachers surveyed are females (97 percent), mostly in their thirties, although a total of 87 percent are between twenty and fifty. More than half of the teachers have a bachelor's degree plus additional course hours, and nearly a quarter of them have a master's degree plus additional course hours. Nearly all of the Title I teachers are both permanent in status and fully certified to teach both their present grade level and subject area, with the majority being certified in both reading and mathematics. Most teachers have spent five years or more in their present school and eleven or more months teaching at their present grade level. The majority of Title I resource teachers have had at least eighteen months of experience in their positions. Most of them have also had at least five years of teaching experience prior to becoming Title I resource teachers. The self-contained classroom

dominates their school settings. Over one-third of the teachers indicated that they teach in an open classroom, while single level classes are approximately as common as multilevel classes.

The Title I educational aides (247 responding to our survey) are primarily in their thirties or forties with a high school or GED diploma. Most of them have even completed some college courses. Slightly more than half of the aides have had college courses in teaching methodology, and some have also studied child development. However, fewer than 20 percent are presently enrolled in college and working toward a degree. Approximately two-thirds have filled this position for at least four years.

Inservice and Staff Development

Only 12.5 percent of the Title I educational aides are enrolled in a Title I sponsored inservice course. Either they were not informed of the course, or they were too busy to attend. Nearly all of the aides express the desire for more inservice courses next semester. The aides generally project a positive attitude, both regarding their personal satisfaction with the course and toward the utility of the information which they gained.

The teacher response to the inservice courses is quite positive, with more than 92 percent of the teachers desiring to participate again. Most teachers surveyed became aware of Title I inservice courses through either their principals or Title I staff. Their most common rationale for not attending an inservice course this year is being too busy.

The greatest single most subscribed to category of inservice courses was reading, with 61 percent of the teachers responding indicating that this was the course that they attended. The mathematics inservice course was attended by 25.9 percent of responding teachers. Only 13 percent of responding teachers indicated that they had attended both courses. A large proportion of the Title I teachers (87 percent) attribute changes implemented in their classroom procedures to the influence of these courses. Some of the most common areas in which modifications were made in the classroom environment, in decreasing order of frequency of occurrence, are:

- Instructional techniques.
- Increased knowledge of the Title I child.
- Use of materials and equipment.
- Amount of time spent on small group instruction.
- Amount of time spent on individual instruction.

These inservice courses represent a usage of resources clearly resulting in modified classroom teacher behaviors. The areas in which most personal benefit to the teachers (as a result of inservice courses) has been derived, in decreasing order, are:

- Knowledge of the Title I child.
- Instructional techniques.
- Use of materials.
- Knowledge of the Title I program.
- Pupil assessment.

Additionally, nearly three-quarters of the Title I teachers agree that both mathematics and reading texts have been appropriate. Resource materials have also been useful.

The attitudes of the vast majority of Title I teachers toward the various inservice activities are positive. The activities, in decreasing order of popularity, are:

- Workshops.
- Professional meetings.
- Staff development days.
- Consultant visitations.

A definite majority of the teachers attest to the relevance, effectiveness, and appropriateness of these activities and to their personal satisfaction with all of them.

These findings concerning inservice are somewhat at odds with the findings of the 1974-75 evaluation pertaining to the same program component. Inservice courses during the 1974-75 evaluation did not receive a very favorable response from the teachers. This suggests that administrators noted these earlier findings and modified the courses.

Teaching Values and Methodology

Over 70 percent of the Title I teachers surveyed entered their profession primarily because they felt that teaching offered a rewarding way of life. The majority of all of these teachers indicated that they spend at least one hour every school night checking papers and preparing lessons at home. The general purposes and aims of education seem to them to have changed little, if any, since their joining the Title I program. More specifically, they rate these as the five most important facets of elementary education, in descending order of importance:

- Reading, computation, writing.
- Social skills, such as cooperation and compromise.
- Abilities to reason and to think.
- Facts and habits of good health.
- Moral values.

This finding parallels the results of the 1974-75 evaluation. The vast majority of the Title I teachers surveyed also concur with the following statements:

- Children learn best in atmospheres filled with love and emotional support.
- Teachers profoundly influence children, their attitudes and their values.
- The relationship between classroom activities and real life situations should be demonstrated to children.
- Periodic classroom testing contributes to effective teaching.

- Children can generally be trusted to do what they are supposed to do.
- Most behavior problems in school stem from the home environment.
- Effective teaching is also facilitated by maintaining order in the classroom.
- Bright as well as slow children deserve a fair share of the teacher's attention.
- The poor achievement demonstrated by elementary school children stems primarily from overcrowded classrooms and inadequate home training.

Disagreement is noted, however, in the Title I teachers' opinions on the following issues:

- The *absolute* importance of the basic skills.
- The superiority of a structured, firm, no-nonsense approach in teaching basic skills, in terms of both effectiveness and students' respect for the teacher.
- The ability of children to select what is best for themselves in most instances.

The same pattern of consonance and dissonance existed in the 1974-75 evaluation. These results reaffirm our initial perception of the Title I teacher as a *humanistic* professional.

Periodic enrollment in courses in teacher training, supplemented by participation in professional meetings and discussion groups, is thought by most Title I teachers to be the best strategy for maintaining professional expertise. Most of the teachers cite self-satisfaction with their work as sufficient reinforcement; however, a large number of them (33 percent) prefer increased pay as reward and encouragement for being a good teacher.

In almost every facet of the classroom environment, the teachers prefer to have a set of rules or guidelines to follow but to be allowed to use their own judgment in modifying the approaches in some situations. An illustration of this sentiment is teacher preference for curriculum guides developed in concert by teachers and their principals over all other types of curriculum guides. The single exception to this mode (namely guidelines with the option of personal judgment) occurs in the matter of contacting parents; in this instance the teachers prefer to use their own judgment unbounded by any preestablished rules.

The teachers also have some definite opinions regarding the issue of motivation in the classroom. To illustrate, they feel that preplanned and effective lesson formats will motivate students, thereby creating stable, productive classroom behavior. In order to set the stage for motivation, two approaches are preferred in interpreting student behavior:

- Behavioral modification—paying attention to the child's behavioral response. The consequent positive or negative reinforcement of the response constitutes an important facet of this method.
- Historical analysis—finding the occurrence(s) in the child's background which resulted in the existing behavioral pattern.

Likewise, two approaches dominate the Title I teachers' attempts to motivate young children, though the first of these is much more commonly adopted than the second (used by 63 percent and 25 percent of the teachers, respectively):

- Human relations—instilling confidence in the child's ability to perform the task by exhibiting a warm and accepting attitude.

- Behavioral modification—praising the child and permitting him/her to participate in a desired activity after completing a task (positive reinforcement).

Generally, the teachers use privately expressed student opinions of them as an index of the success of their attempts to motivate the learners, although the noise level in the classroom during work periods is also given some consideration.

Disobedient, unruly, or undesirable behavior is modified by using the same motivational models. Positive reinforcement for the undesirable behavior is withheld, while the desirable pattern is reinforced. At the same time, the cues for the undesirable conduct are systematically eliminated. The "human relations" technique (trying to understand the unacceptable behavior in order to reduce the child's frustration and to facilitate a more positive experience of school for him/her) is conducive to the attainment of strong student-teacher rapport. Punishment or reprimands are generally dealt out privately (without the other children's awareness), but some teachers (24 percent) prefer to reprimand a student in front of the other children.

School and Classroom Procedures

Over half of the teachers surveyed reported no problems with implementing the Title I program this year. Those who had problems cite a variety of causes, the most frequently mentioned being a lack of essential instructional materials. Virtually all of the Title I teachers utilize student work to enhance their classroom environments.

Teaching strategies vary in both approach and frequency of usage. The most commonly used techniques are demonstration/performance, games, and discovery through guided discussion (at least once per month). Field trips and other classroom excursions are generally rather infrequent (no more often than once per month). The teachers are curiously split, however, regarding their utilization of the contract approach to student motivation:

- One-third never use them.
- One-third use them as much as once per month to once per week.

Most Title I teachers (86 percent) have no non-Title I educational aides, but a large number of them (76 percent) have a Title I educational aide anywhere from one to five days per week. These Title I educational aides, for the most part, are under the direct supervision of the teachers for no more than half a day, but some (33 percent) are supervised by the same teacher for the entire day. Generally, few teachers (20-27 percent) stated they had either a parent assistant or volunteer parent, either in addition to or in lieu of an educational aide.

Responding on their questionnaires, the educational aides listed the following areas, in decreasing order of frequency, as the main roles they perform in their jobs:

- Assisting in supervising pupils on the playground, in halls, or at lunch.
- Assisting pupils individually with learning tasks.
- Escorting pupils to and from the classroom.
- Checking pupils' written work or updating progress charts or other records.

- Distributing or collecting instructional materials.
- Helping pupils with minor behavior problems or personal needs.
- Helping prepare instructional materials.
- Reinforcing learning by conducting drills or games with small groups of pupils.
- Setting up or operating audiovisual equipment.
- Preparing or arranging bulletin boards or displays.

Turning now to equipment and facilities, many Title I teachers either *never* use certain pieces of audiovisual equipment or find that these pieces are not available. These infrequently used items are:

- Audiocard machine.
- Learning machine.
- Tachistoscope or reading pacer.
- Television.
- Radio.

The most frequently cited reasons for not using some of these items are need of repair or replacement, inadequate supplies of pertinent materials or programs, inconvenience, and inadequate space or facilities for usage. On the other hand, some items are used quite often. The most popular of these in decreasing order of frequency of usage follow:

- Record player.
- Tapeplayer.
- Filmstrip projector.
- Movie projector.
- Overhead projector.

In terms of facilities, Title I teachers cited two major obstacles to teacher effectiveness:

- Lack of adequate floor space.
- Lack of sufficient instructional materials and storage space for them.

The library facilities are generally judged by the teachers, however, to be quite adequate. Approximately 57 percent of the teachers use the library at least several times per week, and another 27 percent of them use it at least once per month.

CHAPTER XI. ADMINISTRATION AND SUPPORT SERVICES

To obtain an overview of the administration and coordinative services of the Title I program, the evaluation team reviewed the annual proposal and the summary statement of accomplishments. It also interviewed the Executive and Deputy Director of the program. Representatives of Title I administrative central and regional staff and representatives of Title I school principals met with the evaluation team in two workshops. These workshops were designed to assist in refining evaluation questions and developing an Administrator's Questionnaire.

A group of parents met with the evaluation team to discuss and identify significant questions for the Parents' Survey. This survey was administered to all parents attending Intermediate PAC meetings in May of 1976. Evaluators who attended the Title I Bicentennial Parent Awareness Conference on May 12-13 were able to meet informally with parents to observe Action Labs and to participate in general sessions. Questionnaires were administered to all Title I administrators and to all principals and assistant principals of Title I schools to obtain data regarding administrators' interest and skill areas. Parents attending Intermediate PAC meetings in May 1976 completed Parent Questionnaires. Evaluators interviewed the Acting Director of the Title I Special Education program and the Special Education teachers at one of the centers. The set of evaluation forms used by the teachers to diagnose individual educational deficits, prescribe specific program inputs, and evaluate student progress was reviewed.

Several coordinated services offered through the Title I program were not chosen for in-depth study this year but were reviewed through internal records to define their relationship to the total program. These services will be described in this chapter in terms of their functions in delivering support to the instructional program. The Health Aides component, which was studied in detail, is presented at the end of this chapter.

ORGANIZATION OF FUNCTIONS

Under the Division of Instructional Services, D.C. Public Schools, several interlocking line and staff structures were organized to operate the Title I program in the District of Columbia. The local education agency (LEA), which oversees all Title I operations in the District of Columbia, worked with a District-wide Parent Advisory Council (PAC) to plan, implement, and evaluate the program through a regional and local network of Public Schools-Title I-PAC coordinated functions.

The Title I program is administered as an instructional program of the D.C. Public Schools. The State Education Agency (SEA) for Title I is housed in the State Office, D.C. Public Schools. Management services and research and evaluation functions of the D.C. Public Schools are made available to the LEA. The regional staff of Title I is supervised by the central office of the LEA, which insures coordination of its activities with those of the six regional office staffs of the D.C. Public Schools. The central LEA maintains close communication with the regional offices of the D.C. Public Schools. The Title I regional staff manages and coordinates all Title I activities in local schools in close collaboration with building principals.

The involvement of parents and other community members in planning, implementing, and evaluating the program organized through Parent Advisory Councils, was also coordinated by central LEA staff in 1975-76. Title I regulations required that parents of Title I children in school

units establish local PACs to make recommendations to their regional Intermediate PACs, which, in turn, submitted their decisions to the city-wide District PAC. This parent advisory network was supported and coordinated through the Parental Involvement component of the program.

Local School Functions

A major concern in the District of Columbia was that the local schools and parent advisory councils have maximum responsibility and control over school programs. School-based budgeting, parental involvement at each Title I school, and the integration of Title I resource teachers and supporting personnel into local school staffing patterns maximized the local school team's responsibility.

School-Based Budgeting. School-based budgeting was initiated in the District of Columbia. As a result of the District's model, the practice of involving the school principals and the parent advisory councils in the budget process, from planning to funding, was adopted as a national mandate for all Title I programs, beginning September, 1976.

Parental Involvement. There is a major thrust in the District to integrate parents into all aspects of school life. This has been no less true for Title I. Of the 89 parents who responded to our survey, 83 percent felt that the most important activity parents can undertake to insure the success of their children in a school environment is to become involved in the decisionmaking process of programs such as Title I. The District of Columbia was cited as a national model of successful parent involvement in the 1975 *Annual Report to the President and Congress*, by the National Advisory Council on the Education of Disadvantaged Children.

Other indications of the awareness and concern parents had of their role as prime educators were the responses the parents in our survey gave to a question which asked that they choose from a list of fifteen items those three items they felt were the most important activities parents could engage in with their children. In order of preference, the results were:

- 76.4 percent said parents should be involved in working with small groups of children.
- 48.3 percent believed that attending workshops for parents in reading and mathematics should be a priority activity.
- 39.3 percent chose helping children with homework.

Through the local School Parent Advisory Councils in 1975-76, parents became involved with planning and establishing priorities for Title I, serving in various capacities as volunteers, and working as paid classroom assistants, usually on a part-time basis. It was this type of parental involvement at this basic organizational level which made the entire structure function more responsively to student and teacher input.

Local Coordination through Staffing Patterns. Another distinctive feature of Title I in the District was the instructional strategy employed at each school. The reading and mathematics resource teachers, provided by the Title I program, worked in close cooperation with classroom teachers to be sure that the supplementary program of instruction they provided resulted in a complementary whole. In each public Title I school, all classroom teachers of Grades K-3 and 7 were considered Title I teachers. Though their salaries were paid from the regular school budget, these teachers worked with Title I materials and were totally involved in the entire Title I concept. This strategy allowed complete evaluation of the effectiveness of the instructional process, materials, and impact of the program on both Title I and non-Title I children.

It also appears that Title I staff members—teachers, parents, and administrators—felt positive about the program; they also had confidence in their ability to fulfill their duties. When asked to indicate the areas of knowledge or resources which they considered most important in carrying out their jobs, a sample of 161 staff members selected the following eight items from a list of fifteen These responses in descending order were:

- Decisionmaking (65.8 percent).
- Coordination of program areas (49.8 percent).
- Staff development (49.8 percent).
- Child development (47.2 percent).
- Group dynamics (44.1 percent).
- Needs assessment processes (43.5 percent).
- Management by objectives (42.2 percent).
- Feedback procedures (40.4 percent).

When asked in which areas they had the most expertise or experience, the same sample of staff members answered as follows:

- Decisionmaking (85.7 percent).
- Written and oral communication (84.5 percent).
- Staff development (82.0 percent).
- Program coordination (81.4 percent).
- Preparing a creative classroom atmosphere (77.0 percent).
- Child development (76.4 percent).
- Needs assessment (75.8 percent).
- Feedback procedures (70.2 percent).
- Group dynamics (68.9 percent).

There is also a strong indication that Title I staff members were interested in improving their skills, both in the areas where they already had experience and in new areas.

The group of 161 respondents indicated that their training priorities for the coming year would be in the following areas. They are listed in descending order of priority:

- Management by objectives.
- Team and task force organization techniques.
- Group dynamics.

- Curriculum development.
- Needs assessment.
- Feedback procedures.
- Program coordination approaches.

A major explanation for both the demonstrated confidence in success and clarity of purpose which Title I staff members possessed was the healthy relationship of the staff to the regional structures.

Regional Functions

The decentralization of Title I service delivery through the regional offices provided a mechanism for responsive support to local schools and for coordination with other programs operating within the same geographic area.

The Title I Program of the District of Columbia was divided into five regions. The six regions of the school system were duplicated for Title I except for Regions II and VI, which were combined for Title I because these regions had both a small number of identified children and a small number of schools. The private school component was not operated as a part of the public school regional structure.

Central LEA Functions

Central LEA administration for 1975-76 was supervised by an Executive Director with overall responsibility for the administration of the program at both the central and regional levels. The Deputy Director of Title I managed the instructional support side which included Regional Coordinators, a Staff Development Coordinator, Curriculum Development Coordinator, and two private school coordinators. A Director of Support Services, Dissemination Officer, Coordinator of Parental Involvement, and the Assistant Director for Pupil Personnel Services reported to the Executive Director. Program coordinators were available to each school on a regular basis for on-site consultation. In addition, regional meetings and workshops were conducted regularly.

Dissemination

Title I published a newsletter which highlighted special program activities and provided an overview of the program. In a sample of 730 teachers, administrators, and parents, roughly 65 percent chose program coordination as the most important activity for the success of Title I.

Staff Development

At the beginning of the school year, a two-day orientation was conducted for team representatives from 85 elementary, secondary, and private schools. The orientation not only informed participants about the essential program elements but involved them in planning for effective implementation within their respective schools.

Training seminars throughout the year were conducted within and without a given region. For example, three inservice courses were conducted in cooperation with D. C. Teachers' College. Nearly 400 teachers, educational aides, and administrators were involved in reading and mathematics workshops to gather more tools for individualizing instruction.

Regional resource teachers (formerly staff development team members) were deployed to the regions to assist coordinators in the administration of the program and provide on-site consultation to the Title I resource and classroom teachers. Thus, in addition to the reading and mathematics resource teachers housed in each school, regional teachers were available for further support.

The aforementioned strategies not only provided steady and continuous contact with other programs but technical support when and where it was needed. Training for teachers, parents, and other staff members averaged about 40 hours per person during the year.

ANCILLARY PROGRAMS

In addition to the normal services provided by the Title I program, three ancillary programs were supported through Title I funds. The Consortium interviewed personnel in all three programs and reviewed program records in an effort to delineate the scope of the programs. The results of these evaluation activities are presented in the following sections.

Career Development Pilot Component

The first of these programs was the Career Development Pilot Component. The goal of this component was to introduce identified Title I students in six schools to basic economic concepts which would help clarify the economic life of the home and neighborhood.

In the elementary schools, the emphasis was placed on the study of technology, including a survey of the tools, simple machinery, and instruments which undergird the fabric of daily living and work in our society. Use was made of the creative manipulative activities involving tools, simple equipment, and the expansion of similar activities which make abstract ideas more concrete. The program for seventh grade identified Title I students encompassed a survey of an even fuller range of career opportunities. The structure for individual career development was designed and furnished by both classroom teachers and resource personnel who provided specialized information and skills.

The pilot career foundation component provided several support services to D. C. Title I students. Staff support activities included training programs, field trips, and the provision of supplies. Specific activities included the training of all new project teachers.

Teacher workshops featured the study of the concept of career training, an introduction to local resources for the program, communications and human relations abilities, curriculum development, production of instructional materials, designing "hands-on" experiences, field trips, planning and organization, evaluation skills, and role definition.

The project operated in six public elementary schools and in two public junior high schools. The program served 1,671 students and involved 59 teachers and counselors. The schools involved in the continuation of this project will include Amidon, Bowen, Drew, Lenox, Syphax, Tyler, and Tubman elementary schools, and Jefferson and Randall junior high schools.

Widening Horizons

The second ancillary program which was funded by Title I was entitled, "Widening Horizons." The thrust of this program was to be focused on providing career education for identified Title I seventh grade students who were potential dropouts. Concurrent with exploration of specific career clusters, students were provided with guidance services to aid in self-assessment of abilities, aptitudes, and interests. The career clusters, based on USOE Guidelines, were concerned with consumer and homemaking occupations, communications and media, fine arts and humanities, construction and environment, agri-business, and natural resources and marine science. They also were involved in the study of public service, health, manufacturing, marketing and distribution, business and office occupations. Transportation, hospitality, recreation, and personal service occupations were also in their purview.

The program operated under the leadership of a career counseling aide. Classes were held four days a week in each Title I junior high school. Time was provided for individual conferences between student and counselor aide. As interests in a career cluster were developed, the students were offered the educational and skill requirements necessary for specific occupational areas. Students were simultaneously presented with entrance requirements and course offerings of various high schools which could provide special training. They were given an opportunity to participate in experiential work situations.

Contact was established with private and governmental agencies. These were to provide supportive services and personnel to serve as consultants for the program. Such support included furnishing information on employment opportunities in the metropolitan area and describing correct procedures for attaining employment in private industry and various governmental agencies. The program served approximately 960 identified Title I students. Sixty seventh grade students from each Title I junior high school were enrolled based on criteria which included absenteeism, poor or failing grades, frequent school transfers, advanced age for a given grade placement, financial difficulties, or family problems.

The Widening Horizons program was supported by a volunteer advisory board comprised of interested citizens and parents from a cross-section of the community. Board members' assistance in a wide range of activities served as an effective community involvement mechanism. A youth advisory board was composed of interested children from schools represented in the program. This group offered constructive criticism of program activities and made recommendations pertinent to their operation. The youth advisory board planned out-of-school programs and handled some publicity in the schools.

Community Schools

The last program supported by Title I monies was the Garnet-Patterson Community School. The school provided a significant link between the school and the community which it served. Involving professional staff, parents, and youth, the overall objective was to provide resources beyond those offered by the regular school to identified Title I students who had the greatest needs. Basic premises of operations were that the community school schedule was an extension of formal academic training through informal educational programs; that the development of an effective program was a shared responsibility of administration, staff, parents, community, and students; and that the community school provide opportunities for parents to participate in school and neighborhood programs.

The program was designed to assist identified Title I seventh grade students in improving their reading and mathematics skills through small group instruction, after-school tutoring, and preparing homework assignments. A center for homework and reference work was organized for students who did not have facilities conducive to studying at home. The center provided assistance in developing

good library habits and study skills. The homework center was under the direction of an educational aide trained and supervised by the school librarian.

An academic enrichment program provided opportunities for students to receive skill strengthening and enrichment in reading and mathematics. This approach emphasized individualized instruction. It afforded exploration in other areas as a vehicle for upgrading skills. Specific offerings included sewing, science, vocal music, piano, mathematics, income tax preparation, photography, drama, physical education, and woodworking.

A cooperative program with tutors from Bethesda-Chevy Chase High School met each Thursday afternoon. The schedule emphasized reading and mathematics enrichment and remediation. Not only did it offer shared learning experiences, but it also yielded important human relations experiences between tutors and students. Tutors and students spent an annual exchange day together at each of their respective schools. The program was supervised by the school counselor. The Garnet-Patterson Advisory Council served as a consultant body for the community school. The council, composed of parents, teachers, students, and community, assisted in planning and implementing activities with available resources.

THE TITLE I HEALTH AIDES

The operation of any educational program of the magnitude of the Title I program for the District of Columbia calls for the provision of ancillary services not directly related to program outcomes. Those peripheral services to both students and teachers can add immeasurably to the success of the primary objective of the program. Alternately, they can be a drain on resources much better utilized in other areas of program operation. The general rule for differentiating among supportive and nonsupportive ancillary services is one of causality. It can be determined by answering the question, "Does this programmatic support service provide a unique aid which enhances the singular nature of the intended outcomes of the program?" The answer to this question is difficult to give; nonetheless, it is essential to a determination of causality. The Title I School Health Aide program is an ancillary support component of the present Title I program under contract to the District of Columbia Department of Human Resources. What follows is a first attempt to reveal the nature of the program and to describe its focus.

The School Health Aide component of the Title I program consisted of twenty health aides assigned to various Title I schools. Each aide worked anywhere from one day per week to full-time in a particular school. Responsibility for the supervision and guidance of the health aides rested with two nursing coordinators. One coordinator was responsible for the south region with thirteen aides, the other coordinator, for the north region with seven aides. The south region had more health aides because it contained more Title I schools.

The original cadre group, hired and trained in December of 1972, is largely intact and functioning in the role it was hired to play. Each aide assigned to a school works under the technical nursing supervision of the public health nurse assigned to that unit. Day to day administration within school regulations is under the purview of the school principal. In matters of technical and professional administration, both the health aide and public school nurse are responsible to the supervisor of the district nursing office to which both are assigned. Resolution of any problems which could arise are to be resolved between principal and nursing supervisor. What, then, was the role of the school health aide? Taken from the basic policies and administrative guidelines which govern health aides, the aide role is carefully described:

> The major role of School Health Aide is to assume certain responsibilities of a nonprofessional nature that have been traditionally assumed by public health nurses and school personnel related to the school health program, thus releasing

the time of such personnel for professional responsibilities.

This role has remained essentially unchanged over the life of the program. As the aides gained in experience, they were to be assigned additional duties and their role was to be expanded. Whether this has occurred cannot be ascertained at this time. The aide *assisted* members of the school and health team to perform certain lasts essential to the School Health program. These are activities related to:

- Emergency care for illness and injuries.
- Screening programs scheduled for all children involving testing of vision and hearing and taking of heights and weights.
- Health appraisals.
- Recording of certain information on the pupil's medical record and other health records.
- Improving communications between the health team and the school staff.
- Improving communications with children and their families.

The assignment of school health aides to a particular school was program specific and dependent upon the principal of the school. A principal could refuse to have a health aide and use programmatic funds allocated for health aide salaries for other personnel he wished to hire. Health aide assignment to a school was described in official guidelines as follows:

> The assignment of an aide to a particular school is dependent on the problems, enrollment and facilities, of the school, readiness of the principal and school staff to make maximum and wise use of the school health aide's time, and guidelines as determined by the project. Since one of the prime functions of a school health aide is that of giving first aid, *a well equipped health room is a necessity.* *

The prime function of the health aides was to perform duties of a nonprofessional nature to, thereby, relieve professional members of the health team to perform their tasks. The health aides were asked to perform tasks which their training and job description did not require them to do. They were to assist, not take prime responsibility, for health-related actions.

The instruction of the health aides in 1972 consisted of orientation and on-the-job training which was to prepare them for their role in the schools. The orientation consisted mainly of discussion and lecture on any given subject and reinforcement of the knowledge acquired by on-the-job training. Of the twenty half-days of formal classroom education, most were in the lecture and discussion mode. As part of this classroom procedure, the aides received five and one half days of American Red Cross first aid training.

The other subjects covered in the health aide course consisted of familiarization with the rules and regulations of the school system, delineation of responsibilities, role of the health program in school life, screening procedures, identification of student health problems, and the role of nutrition. Identification, treatment, and prevention of disease vectors were studied with much care. The aides were also instructed on the skills and strategies to use when they made home visits. The health aides

*Author's emphasis

submitted monthly reports of their activities to their respective nursing coordinator. These were totaled and presented, by region, at the end of the school year, to the Department of Human Resources.

Table 11.1 is a summation of the activities, for the past year, of the health aides for the north and south regions. The numbers used to arrive at these figures were derived from reports submitted to the Department of Human Resources by the nursing coordinators, north and south. The classification categories are the same as those on the source documents.

The percentage of the total for each category was derived by dividing the figures in that category by the figures for "First Aid or Other Services Given," which represents the total number of students served. It should be pointed out that some students received multiple services on different occasions. The absolute number of Title I students served, therefore, is somewhat less than the figure would indicate.

Table 11.1
Summative Report of Visits Made by Children to School Health Aides in Title I Schools
1975-76

Reason for Visit	Total	Percentage of Total	Reason for Visit	Total	Percentage of Total
Counseling	279	.98	Skin	1829	6.4
Abdominal Pain	2021	7.1	Sore Throat	703	2.48
Diarrhea	118	.41	Toothache	520	1.83
Cramps	225	.79	Respiratory	285	1.00
Earache	387	1.36	Vomiting	514	1.81
Emotional	165	.58	Other	2110	7.45
Nose Bleed	1199	4.23	First Aid or Other Services Given	28,310	100.00
Eye	836	2.95	Contact Parents 'yes'	11,754	41.51
Fever	603	2.1	Contact Parents 'no'	16,555	58.47
Headache	1672	5.9	Principal	5,710	2.01
Injury	14,650	51.74	Nurse	2,120	7.48
Nausea	194	.68	Recommended or Referred for Medical Care	4,653	16.43

Of interest in Table 11.1 are the categories of injury, referred to nurse, and recommended or referred for medical care. Fifty-one (almost fifty-two) percent of the case load of the health aide called for the treatment of some kind of student injury (14,650 times.) The nurse was involved 7.48 percent of the time the health aide provided services to students. This would indicate that the primary provider of health care in injury cases was not the school nurse but the health aide. This is somewhat at variance with the health aide's assigned duties and responsibilities.

It should also be pointed out that 16.43 percent of the total, or 4,653 cases, handled by the health aides were referred for further medical care. The health aides handled a majority of student health problems themselves (23,657 cases). This indicates that the health aides were carrying a large proportion of responsibility for the cases that they came in contact with. This indication is again at variance with their duties and responsibilities.

It also should be pointed out that the figures in Table 11.1 do not reflect the health aides' role in preschool screening, recordkeeping, or the number of home visits, if any, that they made. The group served by the health aides included an undetermined number of non-Title I students.

As well as reviewing records, the evaluator had the opportunity to talk to both nursing coordinators and to six principals who had Title I health aides in their schools. This was done to provide background knowledge for and gain further insight into the workings of the program. These interviews were conducted in June, July, and August of 1976. All the interviews were congenial and informative, and the evaluator considered them of great importance to the body of the report.

The results of the interviews with the nursing coordinators in the southern and northern sectors confirmed the information that was provided to the evaluator from program records and regulations. The coordinators confirmed the fact that the health aides, in an administrative sense, were not members of the Title I team. They were funded by Title I with $163,000 dollars annually, through the Department of Human Resources. The health aides' pay range was from a GS-2 level through GS-4. The directors were paid by the Department of Human Resources and had additional responsibilities in that regard. The directors also supervised all health aides, both Title I and non-Title I, in their region, as well as the public health nurses in their areas. The directors acted as overall supervisors in most instances, other than those involving individual school policy, for the health aides. In matters of health care, the health aides were only responsible to the public health nurse in their school and to the nursing directors. The directors did note that there was almost no information provided to the Title I health aides explaining the operation and aims of the Title I program. An information supply was seen as a necessity to effect better understanding, by the health aides and Title I staff, of the service responsibility of the Title I health aide to the program objectives. There was some feeling by the nursing directors that more information should be provided to principals about the health aides; while the nursing directors stated that principals had been contacted, some misunderstanding still remained. Overall, the nursing directors felt that the health aides were a valuable resource to the schools and contributed materially to the educational progress of the students.

The principals interviewed, generally, had the same concerns about the health aide in their schools. These concerns were:

- The principals did not understand how the health aide was assigned to their school.
- The principals did not understand where the aide belonged in the administrative chain of responsibility and authority.
- The principals did not understand their relationship to the aides. A common complaint was that the principals could not schedule the aide's working days; essentially, they had no control over the aides.

- Some principals were not aware of the qualifications or training in health responsibility of the health aides. Others expressed the desire for aides with more extensive training.

- The majority of the principals felt that the health aide's role should be expanded to serve all children in their schools (some aides already were) and that aides should oversee some large group health education sessions.

- Some principals interviewed stated that they had never seen a job description for the aide and that they had no role in choosing the aide.

The clearest message to come out of the interviews with principals was that there was a distinct failure of communication in regard to the role of the health aide in the Title I schools. It was not clear then, or is it now, whose responsibility it is to determine whether better communication should begin with Title I staff, Human Resources, Nursing Directors, principals, or the health aides themselves. What was clear was that there was a demonstrated need for improved communication.

In summation, it can be said that the Title I health aides performed a valuable service in the schools. Much of it, however, was out of their area of competency and the limits of their job description. Their role was little understood by the schools they served, but no doubt much appreciated by students they helped.

CHAPTER XII. SPECIAL EDUCATION

Under amendments (Public Law 89-313) to Title I ESEA, federal funds are distributed to school districts. This allocation provides free public education for certain handicapped students on a nonschool district basis. The intent of the funding is to provide for the development and expansion of educational services to handicapped children in the District schools. Title I funds are provided to schools with pupils who are learning disabled, mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, crippled, seriously emotionally disturbed, or who have other health problems requiring special education.

In an effort to comply with the aforementioned law, the Title I program developed a comprehensive plan which emphasized the fundamental right of every child to an equal educational opportunity. This emphasis made it impossible to justify the continual and sometimes arbitrary isolation from the regular educational setting of youngsters who had major or minor intellectual handicaps. Also isolated were students impeded in their cognitive growth and development by either permanent or temporary psychological, physical, or sociological disadvantages. Therefore, to insure equality of educational opportunity, regardless of physical, psychological, sociological, or intellectual impediments, the noncategorical Title I Learning Center program was developed.

The center concentrated on conditions and factors which increased the efficacy of instruction. Its main objective was the return of the child to the mainstream of education on a full-time basis as soon as possible.

The goals of the special education learning centers were:

(1) To provide a specialized, comprehensive, instructional program in mathematical perception and language through Title I resources for mild to moderately exceptional students between the ages of seven to ten years and for other students who have been without educationl experience in a formal school setting.

(2) To provide a learning center approach which would involve the establishment of a variety of learning settings in which a child is placed according to his specific needs.

(3) To develop and implement an instructional program which will attack learning and behavior problems of identified exceptional children through remedial programs designed to meet their individual needs.

(4) To provide regular classroom teachers of participating students with specialized curriculum and management techniques and with opportunities to observe activities in the learning centers in order to modify their perception of children and enhance the instructional program.

The basic purpose of the learning center was to create a total learning environment in which the student's educational, as well as social adjustment problems, were fully examined and treated by a Title I interdisciplinary special education team.

The learning centers for Title I students in kindergarten through third grade focused on improving reading and mathematics achievement and stressing individualized diagnosis and prescription. Programmed learning materials were useful in encouraging the integration of reading and mathematics into other subject areas and learning experiences. Therapeutic horseback riding was utilized as an additional, specialized, multisensory approach for improving perceptual-motor, language, mathematics, and social skills. Each student participated in the riding program for two hours every week.

Students who were assigned to the Title I learning centers remained enrolled in their regular classroom and reported to the center on a part-time basis from 9:30-11:30 in the morning or from 1:15-2:20 in the afternoon. Each center consisted of three settings; one setting concentrated on language, one on perception, and one on mathematics. Every setting was staffed with a teacher and a teacher aide. The centers closed on Wednesday afternoons to provide time for teacher-parent conferences, home visits, and collaborative planning and support for the regular classroom teacher.

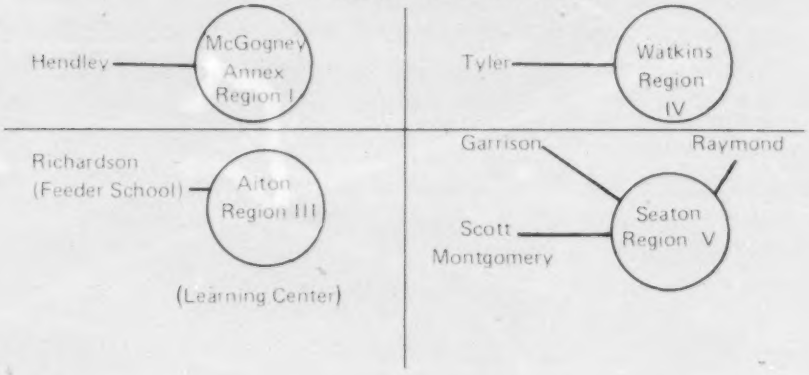
As the child participated in the center program, the regular teacher was apprised of the student's progress on a monthly basis. The instructor was also given periodic reports regarding special problems. The regular teacher was requested to advise the center personnel of the pupil's advancement in the classroom. A staff conference was held prior to each reporting period in order to determine a pupil's improvement. Following this meeting, a report was transmitted by the center staff to the regular teacher to be incorporated in the child's report card. The learning center held "mainstreaming" as its ultimate goal, that is, returning the child to the classroom on a full-time basis as soon as possible.

Approximately one hundred Title I learning disabled children, between the ages of seven and ten years, whose needs could not be met in the regular classroom even with supportive services, were served in four elementary learning centers. Elementary learning centers consisted of one host school, which had the greatest number of identified children, and one to three additional Title I schools. These had an identified population and were designated, on the basis of geographic proximity to the host school, as feeder schools.

The following table depicts the schools which served as centers and feeder schools by region:

Table 12.1

Structure of Special Education Centers



Title I students were referred to the program by the Placement Office of the Department of Special Education or at the local school level. Established referral procedures (see Mills Decree) for placement in the Department of Special Education were followed. Center teachers kept monthly information reports on the total number of students served. Students were placed into one of three categories according to how they were identified. The three categories were (1) students identified through special education placement services, (2) students identified at the local school level who were awaiting special education placement or recommendation, and (3) students identified for tutorial services who were selected at the local school level. Of the three categories, the first, students identified through the Department of Special Education for services, received priority placement and comprised the smallest number.

Table 12.2 presents a monthly enrollment report for each center from January through June. In January, of the 101 students receiving services, only 20 had been identified for placement by the

Department of Special Education. The remaining 81 students were school based and received a limited number of services. Throughout the year, a total of 95 students was identified for placement by the Department of Special Education.

Each of the learning centers was designed to serve from between 24 to 40 students, with actual class size ranging from five to eight students. The centers were divided into three settings, each to serve a specific function; one setting concentrated on mathematics, one on language, and one on perception. Students were assigned to a homeroom teacher in one of the three learning areas, but they moved from setting to setting depending upon their individual needs.

The curriculum used in the learning centers reflected an awareness that the student population was a heterogeneous one.

Table 12.2

Monthly Enrollment Report by Center*

CENTER	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Aiton	20	20	20	20	21	21	21	21	21
Watkins	21	21	21	21	25	25	27	26	26
McGogney Annex	25	25	25	25	25	25	24	24	24
Seaton	35	35	35	35	38	37	37	35	35
TOTAL	101	101	101	101	109	108	109	106	106

*An additional 129 students received indirect services from the program.

Based upon assessment data, individual educational plans were designed for each student. Therefore, a large variety of materials was available, enabling teachers to match the cognitive style of the learner with the demands of the task. Teaching materials were used which differed from those in the regular classroom. When regular classroom materials were utilized, different methods and techniques were employed. Specific academic programs in mathematics and language, which had built-in placement and evaluation materials, were used. Students had the services of itinerant specialists in vision, hearing, and speech, as well as teams from pupil personnel. However, every effort was made to effect an early return of students to the regular classroom setting.

The staff of the Special Education program consisted of one coordinator, nine classroom teachers, and nine educational assistants. Three of the centers (Aiton, McGogney, Watkins) had two teachers and two aides, while the largest center (Seaton) had three teachers and three aides. The Title I Special Education Coordinator was responsible for administrating the activities of all four centers. It was her duty to evaluate and interpret all student test outcomes and to work with the classroom teacher in formulating a program of instruction based on the resultant information. In addition, the coordinator worked on collaborative sessions with principals, classroom teachers, and counselors in schools where centers were located.

Center teachers were responsible for managing the classroom behavior of the students in such a manner as to provide a positive learning climate. They planned, with the center team, weekly and monthly schedules for achieving objectives and completing evaluation. Each teacher functioned as a member of a team of experts in a specialized learning setting and employed the techniques, skills, and materials required to teach students with special needs.

Teacher aides functioned under the supervision of teachers in the following areas:

- Assembling and maintaining project information.
- Keeping records of services performed in the centers.
- Duplicating and distributing reports.
- Observing and recording student behavior and performance.
- Preparing instructional materials.
- Conducting assigned teaching activities with students.

To a large extent, the success of any educational program depends upon the support and involvement which parents exhibit. The learning centers developed a strong program of parent involvement through the following nine activities:

- Home visits by teaching staff.
- Attendance of teachers at P.T.A. meetings.
- Attendance of director at community meetings.
- Involvement of staff in developing curriculum materials using the home and the community as resources.
- Reporting to parents on children's progress.
- Involving parents in the evaluation of the project.
- Regular individual and group meetings.
- Parent workshops.
- Observation of center program.

The following objectives were developed for students who were enrolled in the special education centers:

(1) Given the services of the Title I special education learning centers, 66 percent of the students will increase their reading and mathematics achievement time by three (3) months. This progress was measured by comparison of pre to post test scores on the *Wide Range Achievement Test* from the period of October 30 to May 30.

(2) Given the services of the Title I special education learning center, 75 percent of students will show a statistically significant change in areas such as interest in school, social adjustment,

style of learning, and self concepts as measured by pre-post scores on:

a. Regular teacher evaluation forms.

b. Learning center teacher's child report from the period October 30 to May 30.

(3) Given the services of the Title I Special Education Learning Center program, 50 percent of identified students exhibiting a developmental lag in perceptual motor skills will show growth in perceptual development by May 30. This growth will be measured by a comparison of pre-post performance on the *Frostig Developmental Test* and the *Motor Developmental Survey.*

(4) Given the supportive and collaborative services of the special education learning center, 90 percent of the regular classroom teachers and principals will rate the program as useful or better in providing a curriculum in specialized management techniques that meets the needs of exceptional students. The program will be rated on a five (5) point scale.

(5) Given the supportive services of the Title I Special Education Learning Center program, 90 percent of the parents of participating students will indicate student growth on an end of the year evaluation from two or more of the following areas:

- School achievement.
- Social adjustment.
- Home adjustment.
- Self concept.
- Attitude toward school.

(6) Given a full range of inservice training provided for the learning center staff, teachers will increase their effectiveness in:

- Communication with regular classroom teachers, parents, and administrators. This improved interaction will be measured by program evaluation forms at the end of the year.
- Specialized consultation services to regular personnel. The betterment will be measured by the evaluation of the ongoing collaborative services program by Children's Hospital.

(7) Given the full range of services of the learning center program, at least 10 percent of the enrolled exceptional students will be able to return to the mainstream full-time by the end of the school year.

(8) Given the consultative services of the Title I Special Education Learning Center program, school personnel who have utilized its services will rate it as an effective method for helping teachers meet the needs of exceptional students.

In an effort to measure the effectiveness of learning centers, in relation to their objectives, the Coordinator of Special Education utilized the following materials:

- Administration of the *Wide Range Achievement Test* and *Motor Survey Test* on a pre-post intervention basis to all children enrolled in the Special Education Learning Center program between October 1975 and May 1976.

- Student interviews were conducted on a pre-post basis by the learning center staff to measure changes in self concept, attitude toward school, and confidence in ability.

- Principals, teachers, and related school personnel who utilized the learning center service were surveyed to determine the extent to which the learning center program had helped them to serve the learning disabled child.

- Parents who had children enrolled in the center were surveyed to determine the extent to which they felt the learning center had helped their child.

- School staffs utilizing the services of the Title I Special Education Consultant Team were surveyed and results evaluated to determine the effectiveness of the approach involving increasing the numbers of children whose needs can be met adequately in the mainstream by providing regular teachers with specialized consultant services.

Table 12.3 presents a comparison of students' test scores from pre to post on the *Wide Range Achievement Test* for students enrolled in the learning center.

Table 12.3

Wide Range Achievement Test (WRAT)

Pre and Post Scores, Highest and Lowest, Expressed in Grade Equivalents and Gain Scores for Grades 1 - 3

	Reading				Mathematics			
	Pre	Post	Gain	Median Gain	Pre	Post	Gain	Median Gain
Grade 1								
Lowest	0.9	1.0	0.0	1.2	0.9	1.0	0.0	1.6
Highest	1.3	1.4	0.5		1.9	2.2	1.3	
N=20	Percentage of students with at least 0.3 gain = 15%				Percentage of students with at least 0.3 gain = 60%			
Grade 2								
Lowest	0.9	1.0	0.0	1.4	0.9	1.0	0.1	2.2
Highest	1.7	2.4	0.6		2.4	2.8	1.7	
N = 25	Percentage of students with at least 0.3 gain = 28%				Percentage of students with at least 0.3 gain = 68%			
Grade 3								
Lowest	0.9	1.0	0.1	1.6	0.9	1.2	0.4	2.6
Highest	2.0	3.0	1.1		2.4	3.9	1.2	
N = 18	Percentage of students with at least 0.3 gain = 39%				Percentage of students with at least 0.3 gain = 89%			

Seventy-one percent of the students enrolled in the learning centers exhibited an increase in mathematics achievement gain of more than four months from pre to post. Fewer than 50 percent of the students enrolled in the learning centers showed a gain of three months' achievement in reading from pre to post. Over 75 percent of students enrolled in the learning centers showed a significant, positive, attitudinal change in the areas of self concept, interest in school, social adjustment, and style of learning. Over 55 percent of the students who exhibited a developmental lag in perceptual-motor abilities showed a growth in their perceptual development as indicated by the *Purdue Developmental Test*. A majority of the classroom teachers, principals, and learning center staff who completed a questionnaire concerning the program agreed that it appeared to be meeting the needs of the students.

The Title I Special Education Learning Center program is a well designed, comprehensive approach to educating students whose special needs cannot be addressed in a regular classroom. The criteria for selecting children for the program are developed according to Public Law 93-380, which requires strict identification procedures and due process for all students. The guidelines tend to exclude so many candidates from full service that the budgetary allocation for the program may not be completely utilized. The learning center students who were identified for full services were selected by the Department of Special Education.

Based on the number of pupils who were enrolled in the learning centers, it cost Title I in excess of $3,500 dollars per identified student to provide services in FY 1976. An additional 146 students received partial services from the program. A decision needs to be made as to whether the current procedures for selecting students for the program should be restructured to admit more students to receive full-time services, or whether the program budget should be reduced in relation to the number of identified students being served.

CHAPTER XIII. PRIVATE SCHOOLS

Program Description

Federal legislation mandates that children attending private schools in the District of Columbia qualify for participation in the Title I program. Their participation is contingent on educational deprivation and residency in a geographic area of the city which is designated as a Title I project area. Two public school coordinators working with private school officials are responsible for determining the educational need of children residing within the designated attendance areas. The selection of eligible children is subject to change as eligible public school attendance areas change.

The Title I regulations stipulate that:

> Each local education agency shall provide special educational services designed to meet the special educational needs of educationally deprived children residing in its district who are enrolled in private schools. Such educationally deprived children shall be provided genuine opportunities to participate, therein consistent with the number of such educationally deprived children and the nature and extent of their educational deprivation.

In the District of Columbia, six private schools participated in the Title I program.

The emphasis of the Title I program, as articulated by the District of Columbia school system, was founded on an assessment of needs. The program emphasis was on the development of the basic skills in the areas of reading, written and oral communication, and mathematics. Instruction was based on the diagnostic/prescriptive approach and was skills-oriented using the most appropriate curriculum materials and media available. Skills development was individually prescribed; attention was given to the use of standardized and informal diagnostic tests, learning styles, relevant instructional materials, and skills application. The accent was placed on each child's individuality. An attempt was made to create an instructional climate which was to promote personal development and success.

A survey of private Title I schools indicated that 1,000 children in grades one through eight qualified for participation in the Title I program. Services were provided by four reading resource teachers and five mathematics resource teachers. Of these nine resource teachers, one reading and one mathematics teacher served more than one private school.

Two main objectives were established for private schools by the Title I Program Planning Office. The first of these two objectives states that after seven months of instruction, identified Title I students will demonstrate a mean gain of one year in reading and mathematics as measured by standardized tests. The second objective states that by the end of the regular school year, 75 percent of the identified students will have demonstrated improved *attitudinal changes* and increased interests in learning activities, as identified by an evaluation instrument developed by an outside contractor. These two objectives guided the instruction in the private schools during the 1975-76 school year. During the 1975-76 school year, based on their residency and economic status, approximately 1,000 students in the private schools were eligible for Title I services. These students were tested with a standardized achievement test in the fall of 1975, and approximately 800 were identified as legally qualified for Title I services. Of these identified Title I eligible students, approximately 400 who fell below the 50th percentile on the standardized achievement test were served by the private school Title I program.

Teacher's Questionnaire

The teachers responding to the background questionnaire were all Title I resource teachers assigned to the private schools. Of those responding, five were mathematics and four were reading teachers. One respondent did not indicate a position. The majority of the respondents were women in their thirties and forties, some quite a bit older than their counterparts in the public schools. Six of the ten had a master's degree and some additional graduate credits, and all were permanent teachers certified to teach at their grade level by the District of Columbia Public Schools.

These teachers represented an experienced cadre of professionals that served the Title I child. All had five or more years teaching experience before becoming resource teachers, a position which 60 percent had held for more than 18 months. Seventy percent had been in their schools for more than four years. Most of their teaching experience had been in the District of Columbia schools, both public and private. The average teaching experience outside of the District schools was only 1.6 years. The resource teachers responding to the *Teacher's Questionnaire* only completed the *Educator's Professional Values Scale* and the *Classroom Environment Survey*. The other sections were judged to be not appropriate to the program by its administrators. This response pattern makes our picture of the private school program partially imcomplete; therefore, a comparison between the public and private programs in some areas is not possible.

In response to the *Educator's Professional Values Scale*, ninety or more percent of the teachers agreed with the following statements:

- Teachers have a profound influence on children.
- Teachers are extremely influential in molding children's values and attitudes.
- Children learn best in a classroom filled with love and emotional support.
- Children should be shown how what they are learning relates to the other dimensions of their lives.
- Periodic classroom testing is important to effective teaching.
- Most behavior problems encountered in school can be traced to the home environment.
- Poor achievement of children in the elementary school may be explained by:
    - Too many children in the classes.
    - Too many duties for the teacher outside the classroom.

The pattern of agreement indicates that the teachers are a humanistically oriented group.

The teachers, as a group, did not agree with the following statements:

- Children cannot be trusted to do what they are supposed to do.
- There are no other areas that are more important in education than are the basic skills.
- In teaching the basic skills areas, a firm, no-nonsense approach is most effective.
- Teachers should pay proportionately more attention to the slow learner than the fast learner.

- Keeping order in the classroom is not necessary to effective teaching.

- The ways of encouraging and rewarding good teachers should be by increased pay or allowances above regular scale.

The response pattern to this particular set of questions confirms the previous finding. What the teachers seem to be saying is that while children are basically good, they need a firmly defined structure in which to achieve their best. The previous finding seems to be confirmed by the large (60 percent) figure for teachers who selected the uncertain category when responding to the following statement:

> When given a choice, children usually select what is best for them.

If most of the teachers are uncertain as to children's proclivities, at least they chose to provide an intellectually and emotionally nutrative structure for the child's growth. Private school resource teachers agreed with the public school teachers that increased pay should be a reward for good performance.

The private school teachers, as a group, did not have any problems implementing the 1975-76 Title I program. Since their position basically involved supporting the classroom teacher, this finding is not unusual. In administering their programs, the teachers (at least 60 percent) never used the following pieces of audiovisual equipment:

Television
Radio
Movie projector
Audio-card machine
Tachistoscope, reading pacer

At least 50 percent of teachers responding to this item stated that the equipment was not available in their schools. The pieces of audiovisual equipment which received the greatest use were:

Record player
Tape player
Overhead projector
Filmstrip projector

This information parallels that given by public school teachers. The main reason given for not using a piece of equipment was nonavailability or nonappropriateness for use with the Title I student.

The private school resource teachers had an aide available for two or more days a week. This person was under the resource teacher's direction for at least one-half of the day. The aides performed several functions which allowed the teacher to devote more time to primary tasks. The functions performed by the aides, at least weekly, were:

- Distributing/collecting instructional materials.

- Checking students' written work and updating student records.

- Helping prepare instructional materials.

- Operating audiovisual equipment.

- Escorting pupils to and from the classroom.

- Assisting pupils with learning tasks.

- Assisting pupils with minor behavioral problems or personal needs.

It can be seen from this listing of teacher utilization of aides that the aides performed a valuable service to the students. The teachers stated, as a majority, that they never had the aide supervise the students outside of the classroom. Learning resource teachers had no student responsibilities outside of the classroom in the private school program.

The resource teachers employed a wide variety of strategies to achieve their aims. They used student work to create a livelier classroom atmosphere. The most favored idea, however, was the use of games to introduce a new skill. Also very frequently used were the discovery method of learning and the demonstration performance approach. Students were seldom taken out of the resource laboratory for instructional purposes.

Teacher Aides

The teacher aides of the private schools were also asked to respond to an aide-specific questionnaire. Only two aides responded to the questionnaire, and to report this small representation of their opinion would be a disservice to the program. It can be stated that the private school aides essentially performed the same duties as the public school aides; thus, the perceptions of private school aides approximated those of their public school counterparts.

Student Achievement

The student achievement results for reading and mathematics are presented in Tables 13.1 and 13.2, respectively. The scores for each school were given to the evaluator by the private school coordinators. Student scores were presented as a matched set of pre-posttest results for each student. The outcomes represent only about one-half of the students in the private school program. Only students in grade levels which had pre-post scores are reported in the tables. Since scores for all students were not available, these results should be viewed with some caution and are not necessarily representative of the total program. The reader will also note that some of the sample sizes at various grade levels are very small, and some caution in interpretation is in order.* The evaluator used the Total Reading and Total Mathematics scores even though subscale scores on the various instruments were available. This was done for ease of reporting.

The pattern for reading achievement scores of students in Table 13.1 shows that all students in grades two through eight enter the program below grade level, since this is a criterion for selection. The deficit between documented entering grade equivalent and expected grade equivalent increased by grade level; the higher the grade level, the greater the deficit. This pattern also obtains for the mathematics achievement scores.

This would appear, at first, as the manifestation of the documented cumulative deficit phenomena encountered in other compensatory education programs. This explanation has to be held in abeyance because we do not know the program enrollment history of the students whose test

*The achievement scores were reported to the evaluation team as grade equivalents. Although grade equivalents are easily misinterpreted, we elected to report the scores over the alternative of reporting no student achievement results.

scores we have. The data does suggest a rational reason for a longitudinal study, with existing data, of student progress in the program.

The gain scores documented in Tables 13.1 and 13.2 show that the private school program partially achieved its objectives, as discussed on page 13.2. Since no affective test data was available to document other objectives, no statement regarding their achievement can be made.

Table 13.1

Reading Achievement Test Results (in Grade Equivalents) for Private Schools 1975 – 76

		Total Reading		
Grade	N	Pre (G.E.) Sept. 1975	Post (G.E.) May 1976	Gain
2	40	1.6	2.8	1.2
3	61	2.3	3.6	1.3
4	43	2.9	4.5	1.6
5	52	3.6	4.9	1.3
6	43	4.4	5.8	1.4
7	[illegible]	4.3	6.3	2.0
8	9	5.7	8.1	2.4

	Test Administered	Pre	Post
2	California Achievement Test	Form B, Level 1	Form A, Level 1
3	Comprehensive Tests of Basic Skills	Form R, Level 1	Form R, Level 1
4	Comprehensive Tests of Basic Skills	Form R, Level 2	Form R, Level 2
5	Comprehensive Tests of Basic Skills	Form R, Level 2	Form R, Level 2
6	Comprehensive Tests of Basic Skills	Form R, Level 2	Form R, Level 3
7	Comprehensive Tests of Basic Skills	Form R, Level 3	Form R, Level 3
8	Comprehensive Tests of Basic Skills	Form R, Level 3	Form R, Level 4

Table 13.2

Mathematics Achievement Test Results (in Grade Equivalents) for Private Schools
1975-76

		Total Mathematics		
Grade	N	Pre (G.E.) Sept. 1975	Post (G.E.) May 1976	Gain
2	35	1.5	2.3	.8
3	45	2.2	3.3	1.1
4	55	3.0	3.9	.9
5	67	3.8	4.6	.8
6	62	4.4	5.3	.9
7	54	4.7	6.1	1.4
8	25	6.4	7.0	.6

	Test	Pre	Post
2	Metropolitan Achievement	Primary I, F	Primary II, G
3	Metropolitan Achievement	Primary II	Elementary G
4	Metropolitan Achievement	Elementary F	Elementary G
5	Metropolitan Achievement	Intermediate F	Intermediate G
6	Metropolitan Achievement	Intermediate F	Intermediate G
7	Metropolitan Achievement	Advanced F	Advanced G
8	Metropolitan Achievement	Advanced F	Advanced G

Coordinator: Title I Private School Program

The Title I private school program was linked with the public school program by two coordinators, one reading, and one mathematics. These coordinators were under the general supervision of the Director, Title I program. Their primary responsibility, taken from their job description, was:

> Incumbent is primarily responsible for determining and coordinating instructional curriculum, teaching methods, and support services required to develop basic reading/mathematics skills in approximately 1,000 students (grades 1 through 8) enrolled in nine participating private schools.

Recent information indicates that only six schools were served with approximately 400 students during the 1975-76 school year. Both coordinators were governed in their duties by . . . "guides which are general in nature and include rules of the Board of Education, U.S. Office of Education Title I regulations, policies and procedures established by the Title I Director, and incumbent's own extensive knowledge and understanding of Title I requirements and restrictions." A function of the coordinator was to act as a liaison to the private school program. His/Her role in this regard is described as . . . "Serves as liaison between the Title I central administration and participating private schools to insure that appropriate equipment, materials, and services are made available on a 'loan' basis and that their use is restricted to Title I activities. Designs and directs a special mathematics/reading program for private school Title I students during the regular school term and assists in implementing the operations of Private Schools Summer Total Learning Centers, a six-week summer activity which is an extension of the regular school year." The coordinators had other

duties which are not documented here, which are quite comprehensive in nature and are intended to ensure the smooth functioning of the private school program.

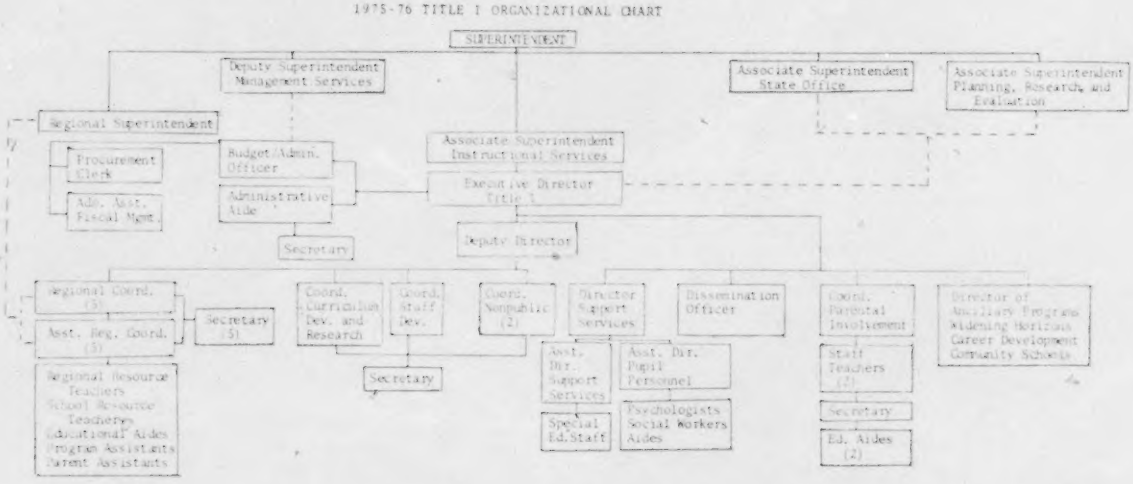
Both coordinators were interviewed during June of 1976 by the evaluator in order to ascertain some of their perceptions regarding their role in the private school Title I program. Both coordinators were quite positive about the effect that the program was having on students. Both felt that the program and the basis for student entrance into the program should be expanded.

Consensus was expressed by the coordinators that the principals of the schools they served did not fully understand the coordinator's role and duties. Also, some concern was expressed about the principals' full understanding of the law, which governed the eligibility of students for Title I services. The coordinators stated that some private school administrators felt that eligibility for Title I services should be based on a determined need, not only residency in a Title I area. The contention, in this regard, was that the private schools drew students from the city at large, but that the residence of the students is secondary, and their educational need is primary.

APPENDICES

APPENDIX A

D.C. Title I Comprehensive Program
Organizational Chart and Position Descriptions



Regions II and VI which have a small number of Title I schools were serviced by the same Regional Coordinator and Assistant Coordinator.

Number	*Position Title*
1	Executive Director
1	Deputy Director
5	Regional Coordinator
5	Assistant Regional Coordinator
1	Director, Support Services
1	Assistant Director, Support Services
2	Coordinators
	Staff Development
	Curriculum Development
1	Research and Planning Associate
1	Dissemination Officer
1	Budget/Administrative Officer
1	Administrative Aide
1	Administrative Aide, Fiscal Management
1	Supply & Procurement Clerk
7	Secretaries

Position Descriptions

- *Executive Director.* The Executive Director administered the total Title I Comprehensive Program in accordance with the ESEA Title I State Plan of Operation, implemented within the Title I target schools of the six decentralized public school regions and the nonpublic school component. The Executive Director provided appropriate support to the six regions in the planning, development, and operating of local school and regional Title I instructional and support activities, supervised the efforts of all components to achieve the goals of the program, administered an ongoing program of monitoring to ensure the uniform and con-

sistent interpretation of federal guidelines, and assisted with the formal evaluation of the district wide Title I program. He administered a program of rapport and assistance to regions in the areas of staff and curriculum development, parental involvement, dissemination, enrichment services, personnel, and fiscal accounting. The Associate Superintendent, Division of Instructional Services, supervised the Executive Director. Liaison and close communication were maintained with the six regional superintendents. Programs for the "Neglected and Delinquent" (*P.L. 89-750*), the "Handicapped" (*P.L. 89-313*), and Special Grants to Urban and Rural Schools were not included within the Director's purview.

- *Deputy Director.* The Deputy Director answered directly to the Executive Director of the ESEA Title I Program. He was responsible for the planning, management, and evaluation of the Title I supplementary instructional program for all identified Title I students. Further, he supervised program services, including curriculum development and implementation, staff development, auxiliary personnel services, enrichment services, the summer school program component, and materials distribution. He also prepared and performed appropriate program monitoring procedures, in addition to providing assistance with the formal program evaluation to assess compliance with federal guidelines and program goals and objectives. As did the Executive Director, he maintained close liaison with the six regional offices.

- *Regional Coordinator.* The Regional Coordinator served under the supervision of the Executive Director. Responsible for the coordination, management, and evaluation of Title I program operations within a designated region, he insured effective implementation of the State Plan of Operation. The two regions which have a small number of Title I schools (Regions II and VI) were serviced by the same regional coordinator. Each regional coordinator provided the programmatic leadership and support needed to insure achievement of program goals; supervised all Title I professional and para-professional personnel; monitored program operations; assessed personnel and program needs; located appropriate sources of help; and provided a comprehensive program of staff development for program employees, in cooperation with Title I and regional staff development personnel. This person aided and supported parental involvement and monitored compliance of program operations with federal guidelines and regulations, the State Plan of Operation, and Board of Education policies and procedures. Close communication and liaison were maintained with that regional superintendent's office to which appropriate support and assistance were provided.

- *Assistant Regional Coordinator.* The Assistant Regional Coordinator served under the supervision of both the Executive Director and the Regional Coordinator. He was responsible for assisting the Regional Coordinator in managing, coordinating, and evaluating Title I program operations within a designated region. One Assistant Regional Coordinator served both Regions II and VI, the two regions with a small number of Title I schools. The Assistant had specific responsibilities related to staff development and personnel supervision.

- *Director for Support Services.* The Director for Support Services answered only to the Executive Director. He planned, developed, managed, and assessed Title I pupil support services and personnel, including pupil personnel, urban service corps, special education, media, and health and enrichment services. He insured that these services gave identified Title I students the support and assistance needed in order to derive more benefit from the supplementary instruction provided by the program. Liaison was maintained with all regional offices, as well as with appropriate departments and agencies of the school system and with the District of Columbia city government.

- *Assistant Director for Support Services.* The Assistant Director for Support Services served under the supervision of both the Executive Director and the Director for Support Services. He planned, developed, and administered the Special Education Noncategorical Compensatory Learning Center Program for those exceptional children eligible for Title I

services. He managed the program, including both instructional and support services designed for student participants, and supervised the professional and paraprofessional personnel of this program component. He maintained liaison with the regional offices, the Department of Special Education, and the appropriate city government agencies.

- *Coordinator for Staff Development.* The Coordinator for Staff Development devised and implemented a comprehensive program of professional development for all Title I staff and parent components (including administrators, teachers, and auxiliary personnel) through a diversified program of orientation activities, workshops, seminars, demonstrations, and off-campus college coursework. Liaison was maintained with the regional staff development offices.

- *Coordinator for Curriculum Development.* The Coordinator for Curriculum Development, in cooperation with the Title I regional coordinators, worked closely with all Title I teachers and staff in the design, development, and implementation of curriculum materials appropriate to the needs of identified Title I students. He coordinated Title I curriculum development activities with the regional curriculum and instruction offices.

- *Research and Planning Associate.* The Research and Planning Associate conducted research related to program components and activities, including assessment strategies, the testing program, curriculum development, and programmatic operations. He provided assistance in program planning and development processes, maintained a statistical data file, and readily supplied information when needed. Liaison was maintained with the Department of Planning, Research, and Development.

- *Dissemination Officer.* The Dissemination Officer developed information materials related both to Title I program operations and to policies and practices for the staff and community. He maintained a channel for information flow among Title I schools, school departments, district and federal government agencies, and the community at large.

- *Budget/Administrative Officer.* The Budget/Administrative Officer worked under the supervision of the Executive Director and the Deputy Superintendent for Management Services. Among his duties were the supervision of budget, personnel action, and procurement activities for the Title I program; the preparation of appropriate business forms and reports for personnel, budget, and procurement agencies of the public school district; and the maintenance of accurate and current financial reports.

APPENDIX B

Normal Curve Equivalents

Any national assessment of program impact requires that the data from the numerous projects being evaluated be comparable. Typically, local education agencies enjoy generous autonomy in the selection of objectives, evaluation methodology, and instrumentation. Hence, the major logistical difficulty for a national evaluation team resides in aggregating various types of scores derived from different tests.

The normal curve equivalent (NCE) presents one solution to this dilemma. Two basic assumptions must, however, be satisfied in order to utilize this metric. Firstly, the tests to be compared must measure, at least approximately, if not actually, the same sets of skills. Several recent research efforts such as the Anchor Test Study (Loret, Seder, Bianchini, and Vale, 1972) indicate that the intercorrelations among the eight most widely used reading achievement tests generally register 0.95 or better. Another study (Roudabush, 1975) shows that these results extend to comparisons between criterion-referenced (CRT) and norm-referenced (NRT) tests; this research effort found the correlation between a CRT and NRT to be equivalent to that between the two alternate forms of the NRT.

The second assumption which must be made relates to the implications and "generalizability" of gains in achievement test scores. Any two tests which purportedly measure a specific ability such as reading comprehension do not necessarily contain essentially identical items or objectives. Nontheless, each test can be expected to contain a subset of items or objectives which do overlap with respect to the construct which they address. In order to use NCEs, an increase in the general ability measured by the two tests must be assumed to be directly indicated by the gain represented in any subset of items or objectives claiming to measure that general ability.

The metric proposed by various researchers as well as by USOE is the NCE. It is a simple, standardized transformation similar to both a Z-score and a T-score. The NCE is distributed normally about a mean of 50 with a standard deviation of 21.06. To convert a raw score to an NCE, a Z-score is obtained using the following formula:

$$Z = \frac{X - \mu}{\sigma}$$

where X = observed or raw score;
μ = population mean; and
σ = population standard deviation.

The Z-score can then be easily transformed into an NCE by this operation:

$$NCE = (21.06)Z + 50$$

If the raw test scores can be translated into percentiles using appropriate tables supplied by the test publisher, then the NCEs representing the raw scores may easily be determined by using a conversion table of percentiles-to-NCEs such as Table B.1. There are also conversion tables available which list the NCE equivalent to every percentile ranging from 0.0 to 100.0 by increments of one tenth.

*This appendix draws heavily from "The Normal Curve Equivalent: A Metric to Measure Instructional Project Impact," by Alice Chiang and Larry D. Rosen.

Table B.1

Normal Curve Equivalent to Percentile Conversion Table

NCE	Percentile	NCE	Percentile	NCE	Percentile
1	1.0	36	25.3	71	84.1
2	1.1	37	26.8	72	85.2
3	1.3	38	28.4	73	86.3
4	1.4	39	30.1	74	87.3
5	1.6	40	31.7	75	88.2
6	1.8	41	33.5	76	89.2
7	2.1	42	35.2	77	90.0
8	2.3	43	37.0	78	90.8
9	2.6	44	38.8	79	91.6
10	2.9	45	40.6	80	92.3
11	3.2	46	42.5	81	92.9
12	3.6	47	44.3	82	93.6
13	2.9	48	46.2	83	94.1
14	4.4	49	48.1	84	94.7
15	4.8	50	50.0	85	95.2
16	5.3	51	51.9	86	95.6
17	5.9	52	53.8	87	96.1
18	6.4	53	55.7	88	96.4
19	7.1	54	57.5	89	96.8
20	7.7	55	59.4	90	97.1
21	8.4	56	61.2	91	97.4
22	9.2	57	63.0	92	97.7
23	10.0	58	64.8	93	97.9
24	10.8	59	66.5	94	98.2
25	11.8	60	68.3	95	98.4
26	12.7	61	69.9	96	98.6
27	13.7	62	71.6	97	98.7
28	14.8	63	73.2	98	98.9
29	15.9	64	74.7	99	99.0
30	17.1	65	76.2		
31	18.4	66	77.6		
32	19.6	67	79.0		
33	21.0	68	80.4		
34	22.4	69	81.6		
35	23.8	70	82.9		

Another method for translating percentiles to NCEs is to find the Z-score in a table (such as B.2) of the cumulative normal distribution for various standardized values. More extensive and precise tables can be found with numbers accurate to many decimal places; however, this table is suitable for the purposes of this discussion. A percentile is actually a decimal fraction with a base equal to 100. Hence, a percentile score of 24.2 percent is equivalent to 0.2420. Using a cumulative normal distribution table, we see that the area under the normal curve equal to 0.2420 corresponds to a -score of -0.70. This Z-score is then substituted in the previous formula to yield the NCE:

$$NCE = (21.06)(-0.70) + 50 = 35.3$$

Percentile scores can also be ascertained when NCEs are known. One method is to convert the NCE back to a Z-score using this formula:

$$Z = \frac{NCE - 50}{21.06}$$

The percentile equivalent to the NCE and Z-score may then be found by using a table containing normal standardized values or Z-scores and the cumulative area under the curve represented by each of these values (see Table B.2). To illustrate the usage of the Z-score table, assume that it is desirable to convert two NCEs—23.7 and 67.8—to percentiles. First, convert the NCEs to Z-scores:

$$Z_1 = \frac{23.7 - 50}{21.06} = \frac{-26.3}{21.06} = -1.25$$

$$Z_2 = \frac{67.8 - 50}{21.06} = \frac{17.8}{21.06} = 0.85$$

Next, the area under the curve for each Z-score is read from Table B.2; this area is equal to a percentile expressed as a decimal fraction. The area for Z_1 is 0.1056; for Z_2, 0.8023. This means that the NCE = 23.7 is equivalent to a percentile score of 10.56 percent; NCE = 67.8, to a percentile score of 80.23 percent. When greater precision is desired in the Z-score values, simply use a table with more precise values for Z.

Another way to determine the percentile score equivalent to an NCE is to use a conversion table for NCEs-to-percentiles such as Table B.3. More precise tables such as this are also available, with NCEs ranging from 1.0 to 99.0 in increments of one tenth.*

*For both precise conversion tables listing NCEs and percentiles, see Chiang and Rosen, in press, Appendices A and B.

Table B.2

Cumulative Normal Distribution

Z	Area	Z	Area	Z	Area
-3.25	.0006	-1.00	.1587	1.05	.8531
-3.20	.0007	-.95	.1711	1.10	.8643
-3.15	.0008	-.90	.1841	1.15	.8749
-3.10	.0010	-.85	.1977	1.20	.8849
-3.05	.0011	-.80	.2119	1.25	.8944
-3.00	.0013	-.75	.2266	1.30	.9032
-2.95	.0016	-.70	.2420	1.35	.9115
-2.90	.0019	-.65	.2578	1.40	.9192
-2.85	.0022	-.60	.2743	1.45	.9265
-2.80	.0026	-.55	.2912	1.50	.9332
-2.75	.0030	-.50	.3085	1.55	.9394
-2.70	.0035	-.45	.3264	1.60	.9452
-2.65	.0040	-.40	.3446	1.65	.9505
-2.60	.0047	-.35	.3632	1.70	.9554
-2.55	.0054	-.30	.3821	1.75	.9599
-2.50	.0062	-.25	.4013	1.80	.9641
-2.45	.0071	-.20	.4207	1.85	.9678
-2.40	.0082	-.15	.4404	1.90	.9713
-2.35	.0094	-.10	.4602	1.95	.9744
-2.30	.0107	-.05	.4801	2.00	.9772
-2.25	.0122			2.05	.9798
-2.20	.0139			2.10	.9821
-2.15	.0158	.00	.5000	2.15	.9842
-2.10	.0179			2.20	.9861
-2.05	.0202			2.25	.9878
-2.00	.0228	.05	.5199	2.30	.9893
-1.95	.0256	.10	.5398	2.35	.9906
-1.90	.0287	.15	.5596	2.40	.9918
-1.85	.0322	.20	.5793	2.45	.9929
-1.80	.0359	.25	.5987	2.50	.9938
-1.75	.0401	.30	.6179	2.55	.9946
-1.70	.0446	.35	.6378	2.60	.9953
-1.65	.0495	.40	.6554	2.65	.9960
-1.60	.0548	.45	.6736	2.70	.9965
-1.55	.0606	.50	.6915	2.75	.9970
-1.50	.0668	.55	.7088	2.80	.9974
-1.45	.0735	.60	.7257	2.85	.9978
-1.40	.0808	.65	.7422	2.90	.9981
-1.35	.0885	.70	.7580	2.95	.9984
-1.30	.0968	.75	.7734	3.00	.9987
1.25	.1056	.80	.7881	3.05	.9989
1.20	.1151	.85	.8023	3.10	.9990
1.15	.1251	.90	.8159	3.15	.9992
1.10	.1357	.95	.8289	3.20	.9993
1.05	.1469	1.00	.8413	3.25	.9994

Table B.3

Percentile to Normal Curve Equivalent Conversion Table

Percentile	NCE	Percentile	NCE	Percentile	NCE
1	1.0	36	42.5	71	61.7
2	6.7	37	43.0	72	62.3
3	10.4	38	43.6	73	62.9
4	13.1	39	44.1	74	63.5
5	15.4	40	44.7	75	64.2
6	17.3	41	45.2	76	64.9
7	18.9	42	45.8	77	65.6
8	20.4	43	46.3	78	66.3
9	21.8	44	46.8	79	67.0
10	23.0	45	47.4	80	67.7
11	24.2	46	47.9	81	68.5
12	25.3	47	48.4	82	69.3
13	26.3	48	48.9	83	70.1
14	27.2	49	49.5	84	70.9
15	28.2	50	50.0	85	71.8
16	29.1	51	50.5	86	72.8
17	29.9	52	51.1	87	73.7
18	30.7	53	51.6	88	74.7
19	31.5	54	52.1	89	75.8
20	32.3	55	52.6	90	77.0
21	33.0	56	53.2	91	78.2
22	33.7	57	53.7	92	79.6
23	34.4	58	54.2	93	81.1
24	35.1	59	54.8	94	82.7
25	35.8	60	55.3	95	84.6
26	36.5	61	55.9	96	86.9
27	37.1	62	56.4	97	89.6
28	37.7	63	57.0	98	93.3
29	38.3	64	57.5	99	99.0
30	39.0	65	58.1		
31	39.6	66	58.7		
32	40.1	67	59.3		
33	40.7	68	59.9		
34	41.3	69	60.4		
35	41.9	70	61.0		

As Chiang and Rosen point out, whatever common metric is utilized by researchers evaluating data from numerous projects, it must possess four qualities:

- *Interpretability.* It must be meaningful and easily grasped by all groups of information users.
- *Sensitivity.* It should discriminate even small differences in pre-post scores.
- *Commonality.* The mean, variance, and distribution must be standardized across all tests.
- *Equal interval.* Any consecutive scale units should be an equal distance apart at any point on the continuum of the scale.

The NCE does enjoy all four of these characteristics. It is more interpretable than stanines and Z-scores; more sensitive than percentiles and stanines; is comparable across all tests, unlike grade equivalents and raw scores; and has an equal interval scale, unlike raw scores, grade equivalents, and percentiles.

In order to utilize NCEs appropriately, the researcher must never compare scores derived from tests which were normed on different populations. Fortunately, most widely used standardized achievement tests are normed on what may be called a "representative" sample of the national population. Hence, NCEs for these tests can probably be compared safely with little concern for the equivalence of the various norming samples. In fact, the Anchor Test Study (Loret et al., 1975) indicates that the normative samples from the national population used by major test publishers are similar.

When using tests normed on a national sample, the NCEs indicate achievement relative to the national norm. Similarly, when using tests normed on some local sample, NCEs actually describe differences in achievement as compared to the local median in terms of the local variance. However, "local" NCEs are not comparable to "national" NCEs, since they represent scores on tests using *different* norming populations.

NCE gain scores can be estimated from locally normed scores (for example, criterion-referenced test scores) and then used to compare with NCEs derived from nationally normed scores. The NCE gain is calculated using this formula (Chiang and Rosen, p.10):

$$NCE = 21.06 \frac{\bar{Y} - \hat{Y}}{S_{LOCAL}} * \frac{S_{NRT}}{\sigma_{NRT}}$$

where $\bar{Y}$ = mean posttest score for treatment group;

$\hat{Y}$ = mean posttest score for no-treatment or control group;

σ_{NRT} = national population standard deviation on a norm-referenced test, given in the test publisher's technical manual;

S_{NRT} = sample group's standard deviation on the same norm-referenced test; and

S_{LOCAL} = sample group's standard deviation on the locally normed test.

The basis for this equation requires the assumption that the ratio between the sample group variance and the national population variance on a norm-referenced test should be equivalent to the ratio between the sample group variance and the national population variance on a locally normed test. In addition, the correlation between the norm-referenced and the locally normed tests must be high, thereby indicating that they are measuring approximately the same thing. Current research (Roudabush, 1975) indicates that this procedure is at least reasonable.

APPENDIX C

A Rationale and Approach for Causal Analysis

In project evaluation, the appearance of consistent temporal dependency between two events or variables is explicable in only one of two ways: Event 1 may be seen to have operated as a cause of Event 2, or both events may be viewed as the mutual effects of some more general, unmeasured third variable. In the experimental arena, the controlled application of Event 1 (the independent variable) effectively negates the plausibility of the second alternative and forms the basis of all experimental causal inference. Indeed, the independent variable is so termed because it can be controlled or presented as independent of its natural sources of variation (Crano and Brewer, 1973). In simple, "one-shot" correlational research, all variables are essentially embedded within their natural matrix of temporal covariation. Hence, the power of time-order in the generation of causal inferences is forfeited. Suppose, however, measures on two (or more) variables were available for comparison, assessed approximately contiguous at two points in time.

For the sake of continuity, let us assume that we have longitudinal data for 2000 first grade children on the Visual Perception and Comprehension area of the *Prescriptive Reading Test*. The resulting matrix of correlations might resemble the one in Table C.1. Figure C.1 gives a graphic presentation of these data. On the basis of past research, the synchronous correlations (r_{12}, r_{34}) involving the contiguously administered instruments can be expected to be reasonably strong. Similarly, the lagged auto-correlations should exhibit a reasonable degree of relatedness.

Table C.1

Table of Correlations Between Visual Perception and Comprehension, Measured in the Fall and Spring

Test and Time		V_F	C_F	V_S	C_S
Visual Perception	—Fall (V_F)	—			
Comprehension	—Fall (C_F)	0.59	—		
Visual Perception	—Spring (V_S)	0.30	0.21	—	
Comprehension	—Spring (C_S)	0.30	0.25	0.71	—

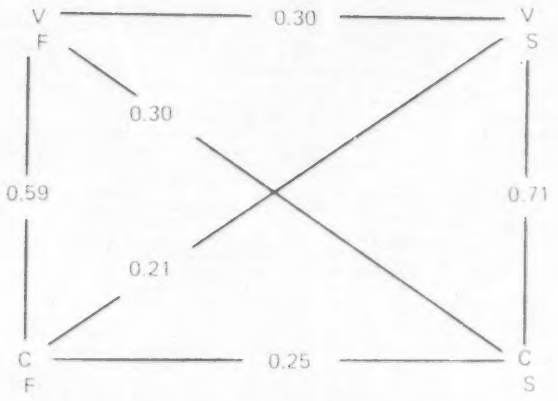


Figure C.1 Graphic Presentation of Cross-Lagged Panel Data from Table C.1

For purposes of causal inference, however, the cross-lagged correlations (r_{14}, r_{23}) provide information of critical interest. There are three possibilities arising from a comparison of these values. Suppose that the visual perception level for students in the fall caused the development of later comprehension in the spring, but the comprehension in the fall had no causal implications for later visual perception. If such a causal pattern existed, the cross-lagged correlation between visual perception and comprehension ($r_{14}=0.30$) would exceed significantly that relating early comprehension to later visual perception ($r_{23}=0.21$). This finding, in fact, represented in Table C.1, indicates the causal influence of visual perception on comprehension. This is what is actually found in the present evaluation.

As noted, the status or change in a variable consistently followed by a change in status of another variable satisfied the time-precedence demands of causal inference discussed earlier. Such temporal dependencies are suggested by inequalities between cross-lagged panel correlations. Of course, an absolute causal statement on the order of "X caused Y" could not be supported on the basis of differences between cross-lagged panel correlations, but inferences concerning the *preponderant causal relationship* operating between visual perception and comprehension variables are quite legitimate. Inferences such as these enjoy the same logical status as those derived through the use of the experimental method, a system that provides the analogue on which this novel analytic approach is grounded.

In the absence of any reasonable empirical data, it is most conservative, at this point, to assume that both visual perception and comprehension skills might operate causally with respect to one another. The possibility of reverse causality is not neglected in this research, and the operation of a feedback loop is not discounted. With sufficient data panels and appropriate sampling of time intervals between instruments, such possibilities are well within the investigative boundaries of this technique. Given the data presently available, however, a clear estimate of the preponderant causal relationship between these variables is possible and represents one of the major contributions of this evaluation. The interplay of various criterion-referenced skills and objectives might comprise a major substudy. Such an analysis could reveal a very intriguing pattern of results, relating a host of reading or mathematics subtests to one another and suggesting developmental sequences and intervention approaches previously unmentioned in the literature of instructional research in reading and mathematics. The possibilities of such an approach have been demonstrated in earlier cross-lagged panel correlational research (see Crano, 1974; Crano and Johnson, 1976).

It is important, at this point, to mention a final possibility that might exist in the data. It is conceivable but not probable that no causal relationship exists between visual perception and comprehension; it may also be that the observed covariation between these two concepts represents an instance of "third variable causation," in which both measures are, in reality, the effects of a more general cause (see Crano and Brewer, 1973). If such is the case, no differences in cross-lagged correlation values ($r_{14}=r_{23}$) may be expected. Given such a result, no clear distinction between either of these two rival alternative hypotheses can be made.

It seems reasonable to expect that different patterns of causal relationships might emerge from an analysis of PMT and PRT data. These divergencies could prove quite valuable in the generation of hypotheses and potential intervention strategies. Ultimately, the outcome of the mass of information gleaned in such a study could serve a number of theoretical and applied purposes. Hopefully, the findings would provide us with a series of data-grounded hypotheses concerning the development of reading and mathematics abilities and the relative emphasis which should be assigned to various skills at different grade levels. Depending upon the functional characteristics of these relationships and the perturbations of the relationship occurring as a result of subsample characteristics, a very advantageous position to generate a theoretical model of factors, which might affect reading and mathematics, could be achieved. The data should further allow speculation on the means by which encouragement of the growth and development of these basic skills in order to maximize the potential outcomes for a wide variety of children could be found. Given the size and diversity of the available sample and the potential for cross-validation of results, a very secure position with reference to the generalization of outcomes could be obtained. Perhaps no other evaluation activity would have the instructional implications of a careful causal analysis of PMT and PRT data.

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